AY 15, 1948

Engineering Library
Engineering Library
UNIVERSITY OF MINN. RECEIVED MAY 20 1948 LIBRARY

AUTOMOTIVE INDUSTRIES

IN THIS ISSUE

Improvements in Steel Torsion Rod Springing
Dynaflow Production—An Exacting Precision Job
Furnaces Cut Costs in Propeller Manufacturing
Mass Production Methods Applied to Heavy Duty Trucks
The Effect of ERP on the U.S. Economy
A Look at Latin America as a Future Export Market

Complete Table of Contents, Page 3

This New Addition to the Heald Line gives *NEW EFFICIENCY* in finishing small parts

With the *completely new* Heald 171, small to medium size parts can be precision ground on a mass-production basis—and with minimum effort! Grinding cycles are completely automatic once the work is loaded and the starting lever advanced. Outstanding design features include: *New Feed Mechanism—Uniform Speeds and Feeds—Sealed Hydraulic System—Centralized Controls—Anti-friction Cross-Slide—Rapid Machine Cycles—Automatic Lubrication—Isolated Power Unit.*

Like other Heald automatic internals, the 171 is available with both Size-Matic and Gage-Matic sizing, or with the Size-Matic method alone.

This latest addition to the Heald line is the result of over 20 years experience in building automatic internal grinders to meet the most exacting production requirements. Its many new design features assure greater precision—better finish—higher production—less operator fatigue—and easier maintenance.

For complete information, get in touch with your nearest Heald branch office—or, better still, come to Worcester and see for yourself.

HEALD

THE HEALD MACHINE COMPANY, Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit • Indianapolis • Lansing • New York

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

May 15, 1948 Vol. 98, No. 9

Contents

High Spots of This Issue 15
News of the Automotive Industries 17
Eternal Vigilance Is the Price of Liberty
By Joseph Stagg Lawrence 25
Making the Dynaflow—An Exacting Precision Job
By Joseph Geschelin 26
Oldsmobile Organizes Bumper Bracket Setup 29
Improvements in Steel Torsion Rod Springing
By H. E. Simi 30
How Helping Europe Will Affect Our Economy
By Karl Rannels 33
Our Future Export Market in Latin America
By George M. Galster 34
Making Heavy Duty Trucks by Mass Production Methods 36
F-Head Engine Powers 1948 Rover Models
By W. F. Bradley 38
Furnaces Save Propeller Costs. *By John D. Waugh* 40
Javelin Design Features 43
First Turbosupercharger Application on Airliner 44
Airbriefs. *By Robert McLarren* 45
New Creep Testing Machines. *By Joseph Marin* 46
New Production and Plant Equipment 48
New Products 54
Publications Available 56
Calendar 67
Observations. *By Joseph Geschelin* 92
Business in Brief 96
Personals 98
Advertisers' Index 158

Copyright 1948 by Chilton Company (Inc.)

Owned and Published by

CHILTON COMPANY (INC.)

Executive Offices

Chestnut and 56th Streets, Philadelphia 39, Pa., U. S. A.

Officers and Directors

JOS. S. HILDRETH, *President*

Vice-Presidents

EVERIT B. TERHUNE P. M. FAHRENDORF JULIAN CHASE
THOMAS L. KANE G. C. BUZBY CHARLES J. HEALE
WILLIAM H. VALLAR, *Treasurer* JOHN BLAIR MOFFETT, *Secretary*
HARRY V. DUFFY T. W. LIPPERT FRED V. COLE

GEORGE MAISWINKLE, *Asst. Treas.*

OFFICES

Philadelphia 39, Pa., Chestnut & 56th Sts., Phone SHerwood 7-1424
New York 17, N. Y., 100 East 42nd St., Phone Murray Hill 5-8600;
Chicago 1, Ill., Room 916, London Guarantee & Accident Building, Phone Franklin 4243; Detroit 2, Mich., 1015 Stephenson Bldg., Phone Madison 2090; Cleveland 14, Ohio, 1030 Guardian Bldg., Phone Cherry 4188; Washington 4, D. C., 1091 National Press Bldg., Phone District 9109 and 8110; San Francisco 5, Calif., 605 Market St., Room 608, Phone Sutter 1-4951; Los Angeles 1, Calif., 6000 Miramonte Blvd., Phone Lafayette 5525.

Cable Address ..... Autoland, Philadelphia

Member: Audit Bureau of Circulations; Associated Business Papers, Inc.

AUTOMOTIVE INDUSTRIES is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

TOUREK
BALL JOINTS

Production Costs Drop When You Order From Stock

Tourek's line of ball joints includes 12 standard types in 54 sizes . . . This wide range of selection frequently enables manufacturers to specify an assembly directly from stock to meet exact requirements, thus effecting a saving in production costs and eliminating delivery schedule problems.

When special ball joint assemblies or precision screw machine products are necessary to meet requirements for new applications, Tourek's designing and manufacturing experience provides a source of valuable assistance.

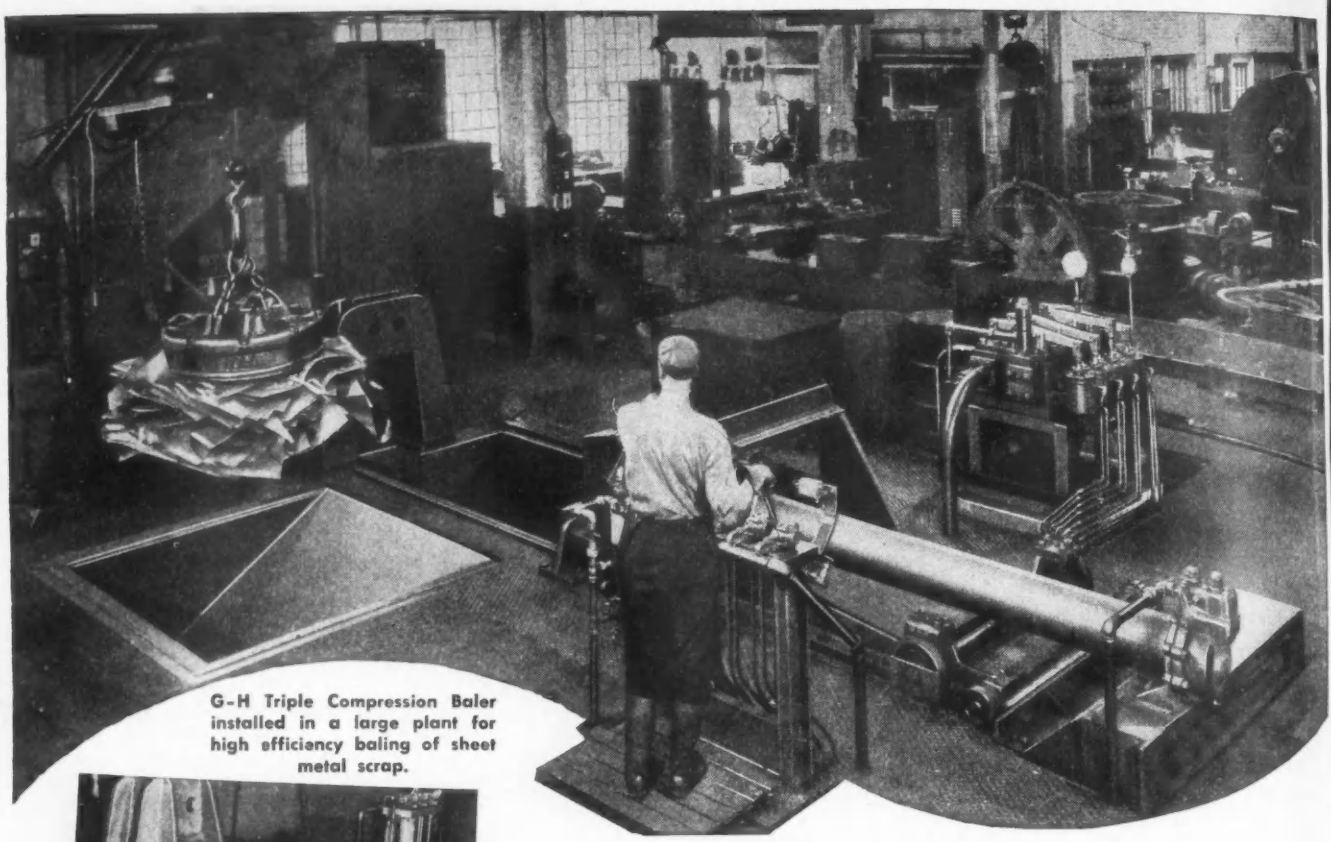
Write for Tourek's 16-page ball joint catalog—it contains complete specifications on standard types and sizes, as well as data on special types.

J. J. TOUREK MFG. CO.
4701 W. 16th Street, Chicago 50, Illinois

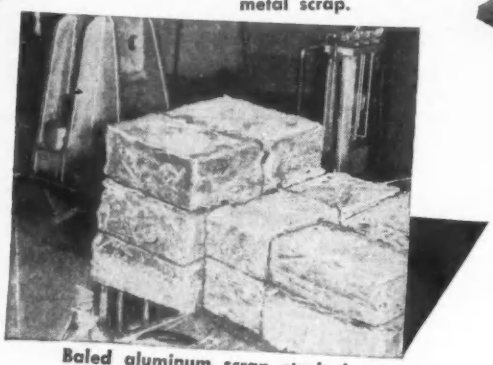
MAKERS OF PRECISION SCREW MACHINE PRODUCTS

ESTABLISHED 1920
TOUREK
FAMOUS BALL JOINTS

AUTOMOTIVE INDUSTRIES, Vol. 98, No. 9. Published semi-monthly by Chilton Co. Chestnut & 56th Sts., Phila. 39. Entered as Second Class Matter October 1, 1925, at the Post Office at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. In case of Non-Delivery Return Postage Guaranteed. Subscription price: United States, Mexico, United States Possessions, and all Latin-American countries, $2.00 per year. Canadian and Foreign $5.00 per year; single copies, 25 cents, except Statistical Issue (Mar. 15th), 50 cents.



G-H Triple Compression Baler installed in a large plant for high efficiency baling of sheet metal scrap.



Baled aluminum scrap stacked on skids for easy loading.

Finished bales carried to cars by conveyor.

Baled Sheet Metal Scrap is Vital to Production...

A steady, adequate flow of properly prepared scrap metal, both ferrous and non-ferrous, to the mills, smelters and foundries is highly essential to meet the increasing demand for new metal and castings. Today it is indispensable in maintaining high-level industrial production.

A most desirable type of "scrap" is *sheet metal scrap* in the form of dense, compact bales . . . correctly sized and classified. It can be used immediately, without extra handling or preparation, to charge furnaces or cupolas. That's why it always commands premium prices.

If your daily accumulation of sheet metal stampings or clippings amounts to 5 tons or more, you will find it profitable to bale it the G-H way. Furthermore, you will be contributing to your own continuous supply of new metal!

For experienced Counsel on your Baling Problems, consult—

GALLAND-HENNING MFG. CO.
2747 S. 31st STREET • MILWAUKEE 7, WIS.

. . . builds Hydraulic Scrap Metal Balers in a complete range of sizes and capacities from ¼ ton to 20 tons per hour and more.

GALLAND-HENNING

SCRAP METAL BALING PRESSES

A5247-1F

AUTOMOTIVE INDUSTRIES

EDITORIAL STAFF

Julian Chase, Vice-Pres. and Directing Editor
J. R. Custer, Associate Editor
Jos. Geschelin, Detroit Editor
Marcus Ainsworth, Statistician
H. H. Roberts, Ass't Editor
W. T. Bostelman, News Editor
Jerome H. Farris, Ass't Editor
Leonard Westrate, News Editor, Detroit
E. J. Hardy, Washington Editor
Karl Rannels, Washington News Ed.
George H. Baker, Washington News Ed.
R. Raymond Kay, Pacific Coast Ed.
Howard Kohlbrenner, Art Director
Alphonse Sirauskas, Art Editor
W. F. Bradley, European Correspondent

•

Paul Wooton, Washington Member, Editorial Board

•

BUSINESS DEPARTMENT

G. C. Buzby, President and Manager, Automotive Division
E. H. Miller, Adv. Mgr.
E. W. Hevner, Cir. Mgr.

•

REGIONAL BUSINESS MANAGERS

John T. Hoole, Chicago
E. E. Elder, Detroit
Nelson W. Sieber, Philadelphia
Harland E. Boyd, Cleveland
A. R. Eckel, New York
C. H. Woolley, San Francisco
August Haurin, Jr., Los Angeles

•

AUTOMOTIVE INDUSTRIES
Reg. U. S. Pat. Off.

High Spots of This Issue

Making the Dynaflow

The Buick Dynaflow represents on of the most exacting precision manufacturing jobs ever undertaken by any motor car producer. A description of the tooling and unique machinery necessary, how they were designed and obtained makes a most unusual article. It should be on your "must read" list and starts on page 26.

Improvements in Steel Torsion Bar Springing

A new and more easily serviced application of the "Gravity Spring" torsion-rod springing system has been devised, that also gives smoother riding qualities. It is an interesting development and is fully described and illustrated in an article that begins on page 30.

Our Future Export Market in Latin America

The industrialization of Latin America opens up a huge new market for the manufacturers of automotive products and manufacturing equipment. There are some very revealing figures and other data in the article that you should read on page 34.

F-Head Engine Powers 1948 Rover Models

The design of the Rover line includes an entirely new F-head engine with hemispherical combustion chambers, a new front suspension and a shortened chassis with box-section side and cross members. These and other interesting features are described and illustrated on page 38. There is a table of specifications that will prove interesting as well.

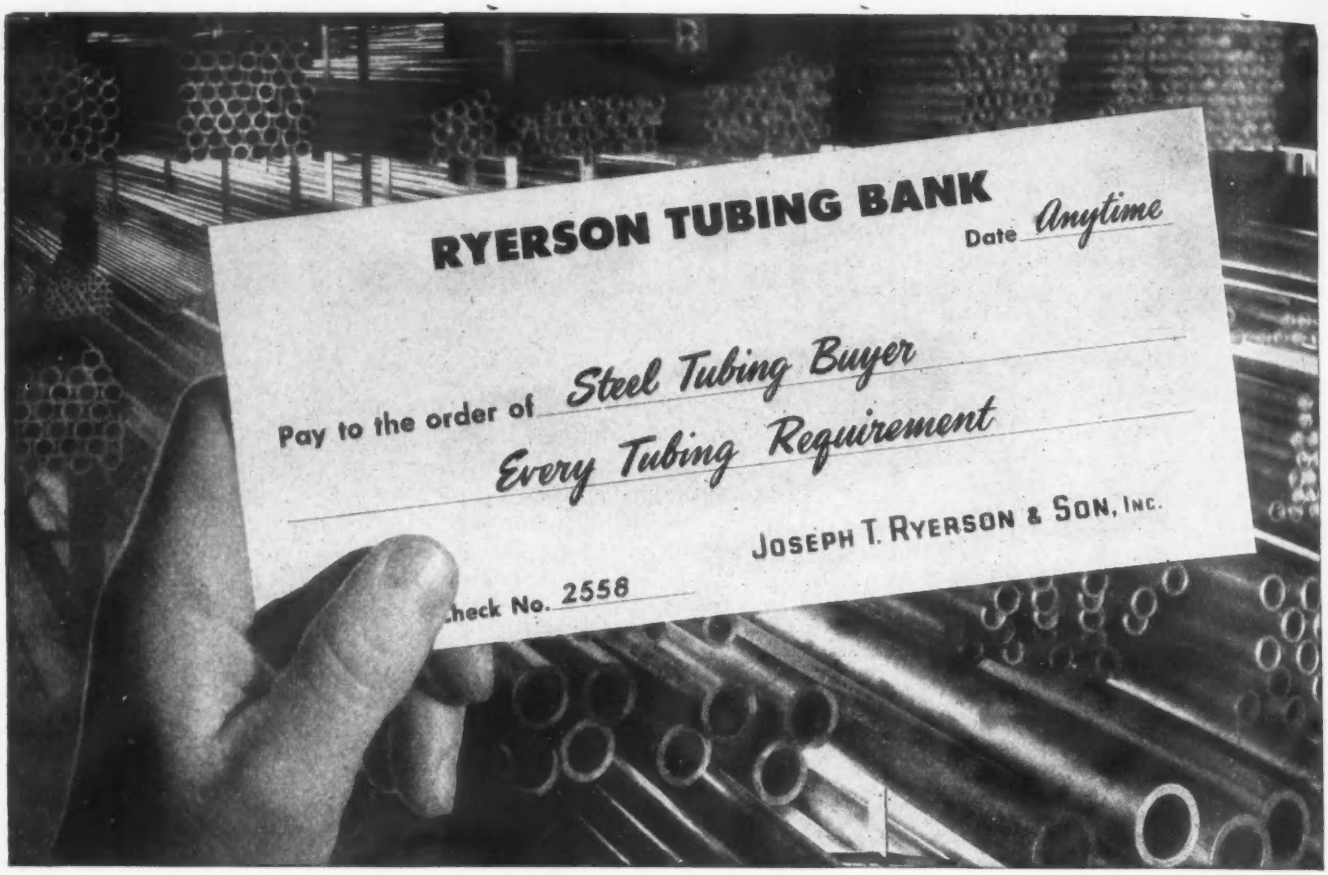
Furnaces Save Propeller Costs

A new technique in the manufacture of Aeromatic propellers has brought about savings in materials, time, labor and costs. This is a case where careful planning has created innovations that should be of wide interest. See page 40.

22 New Product Items And Other High Spots, Such As:

Oldsmobile's new forge plant department; requirements of ERP nations in Europe for trucks and steel; how Federal Motor Truck Co. in Detroit has applied mass production methods to heavy duty trucks; unusual design features of the British Javelin car now being displayed in this country; details of the first turbosupercharger for an airliner; a summary of important events in the aircraft industry; and a description of some new static and dynamic creep testing machines.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See page 3


RYERSON TUBING BANK
Date Anytime
Pay to the order of Steel Tubing Buyer
Every Tubing Requirement
JOSEPH T. RYERSON & SON, INC.
Check No. 2558

Draw without Restraint on Your Ryerson Tubing Bank

Are your tubing requirements measured in inches or miles? When you contact Ryerson you can be sure of prompt delivery in either case, because tubing stocks "on deposit" at Ryerson plants are the largest in the country. Low carbon, cold drawn tubing, both seamless and welded, is on hand in a wide range of sizes. Pump cylinder tubing, pressure tubes, stainless tubing, pipe and fittings—practically any requirement can be shipped on short notice.

You save purchasing time when you draw on large, conveniently-located Ryerson tubing stocks, and you simplify shop operations as well. Ryerson tubing meets high standards of size accuracy, concentricity and straightness; so machining time is cut to a minimum.

For help on questions of application or fabrication Ryerson is again the source. Experienced men who devote all their time to tubular products are on call at every Ryerson plant. They are well qualified to work with you.

So depend on Ryerson tubing service to pay off in prompt, personal attention to your requirements—and quick delivery of quality steel. Call the nearest plant for any type, size or quantity.

Joseph T. Ryerson & Son, Inc. Steel-Service Plants at: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco.

OTHER PRODUCTS

CARBON STEEL BARS—
hot rolled
cold finished
reinforcing
STRUCTURALS
PLATES
SHEETS & STRIP STEEL
ALLOY STEEL BARS
ALLEGHENY STAINLESS
sheets, plates, bars, etc.
TOOL STEEL
BABBITT METAL
MACHINERY & TOOLS
for metal fabrication

RYERSON STEEL

NEWS of the AUTOMOTIVE INDUSTRIES

Vol. 98, No. 9 May 15, 1948

Coal Strike Cuts Output of Cars in April & May

Prospects for automobile production during May are definitely on the pessimistic side. April, with a combined U. S. and Canadian production of slightly more than 450,000 units, was about 50,000 behind the high mark made in March, and May promises to be considerably behind April. GM plants started closing down the last week in April and continued into the first week in May, with all passenger car divisions down from a week to ten days because of the shortage of steel. The coal strike has hit production seriously, and it is now believed that it will be well into June before the industry can again hit its stride. There is also a possibility that strikes over the wage issue might close down one or more companies. If a stoppage does come it undoubtedly would be at Chrysler and not at GM, at least at the outset.

With all of the troubles the industry has been experiencing, predictions for an increase of perhaps ten per cent in total production of cars and trucks this year have practically disappeared. The effects of the Marshall Plan and the rearmament program on the steel supply are still not known, but they will certainly take an indefinite amount of steel that otherwise might go to the automobile industry.

British Gas Turbine for Automobile Use

Believed to be the first in the world, a gas turbine engine designed for use in automobiles has been announced by the British government-owned Power Jets Research and Development Co. in London. Weighing 250 lb. the engine develops 35 hp and measures seven in. in diameter and five ft in length. It was invented by R. H. Barr and Geoffrey White, and will run on kerosene or Diesel fuel.

Ford Shuffles Export Personnel

Evidence that Ford Motor Co. is putting its foreign operations through a personnel shakedown similar to that carried out in the U. S. organization is seen in the resignation of Lord Perry from the chairmanship of the Ford Motor Co. of Great Britain. When Henry Ford II returned from Europe recently he stated that considerable reorganization of foreign operations was in prospect. Shortly afterwards he announced the election of Graeme K. Howard as vice president and director of the international division of the company. Mr. Howard had joined Ford as a consultant on international operations a few months prior to his appointment to his present post. He resigned as vice president of European operations for GM last year.

WILLIAM S. KNUDSEN

1879-1948

His life history, well known to all, truly symbolizes the American System of Free Enterprise. He said of America, "It has been pretty good to me." America can say of him that he was good to us and to the entire world. A great industrialist, a genius of mass production, he proved himself in time of need to be "The Master Armorer".

Born—Copenhagen, Denmark, March 25, 1879
Died—Detroit, Michigan, April 27, 1948

Tucker Makeready Costs Over $11 Million

Tucker Corp. reports that it has spent more than $11 million to date getting ready for production of its new automobile at its Chicago plant. Preston Tucker, president, reported that the company has approximately $6.7 million cash on hand in addition to $4.6 million in notes given by dealers in payment for franchises. Work on the initial 125 pilot cars is underway with about 100 units scheduled to be on the body lines this month. Assembly line production is still expected to start in June although at a very nominal rate. Mr. Tucker said that volume production is contingent upon the company acquiring a government-owned blast furnace at Cleveland which it is trying to buy. He said that first cars produced will use the engine being built by Aircooled Motors, Inc. at Syracuse, N. Y.

Dodge Opens New Plant for West Coast

Dodge Div. of Chrysler Corp. has opened its new plant at San Leandro, Calif. L. L. Colbert, president of Dodge, presided at the formal opening ceremonies May 4 at the new plant, the first all-Dodge assembly unit to be opened in California. It has 300,000 sq ft of space.

Run GM Kettering Engine on 100 Octane Fuel

Although no one is thinking in terms of automobile engines with compression ratios of 12.5 to 1 as a near possibility, GM has proved that it is possible to drive a car equipped with such an engine across country using available fuels. The company's engineers recently drove a car with 12.5 to 1 ratio from Detroit to Texas, fueling at airports with 100-octane aviation gasoline. The engine is reported to have functioned satisfactorily. Further information on the new V-8 engine being planned by Oldsmobile for introduction in the 1949 model is that the engine will be designed for a compression ratio ultimately of 12.5 to 1, with no changes required other than modifying the cylinder head.

NEWS *of the* AUTOMOTIVE INDUSTRIES

SACKLESS CEMENT

Hauling 115 bbl of cement in a single load, two special Fruehauf semi-trailers in combination with a converter dolly are used by the Southwest Portland Cement Co., Victorville, Calif. in making deliveries of bulk cement. The trailers are loaded from hoppers at the mill and dumped directly into customers' bins, eliminating sacking costs.

Packard Elects Greiner as Vice President

Directors of Packard Motor Car Co. have elected Karl M. Griener, general sales manager, a vice president. He will continue in the sales post he has held since Nov., 1947, when he succeeded Lyman W. Slack. Hugh J. Ferry, secretary and treasurer, was also elected a vice president.

Ford of Canada to Import British Cars

Ford Motor Co. of Canada has announced that it will resume importation of British-made cars and light trucks from the Ford Motor Co. plant at Dagenham, England.

K-F Sells Indiana Steel Mill

The Kaiser-Frazer Corp. has sold its Indianapolis steel rolling mill facilities to a group headed by Victor Nemoroff, president of the Electro Mfg. Corp., Chicago. The sale, which is effective July 1, is reported to include K-F's original investment of $1.1 million paid for the mill last October, plus the cost of improvements made since then. Clay P. Bedford, K-F vice president, said that the facility is being disposed of because the company's basic steel supply prospects have improved greatly in the past 90 days as a result of the acquisition of the Ironton blast furnace at Provo, Utah, which is expected to produce at an annual rate of 300,000 tons of pig iron.

Lincoln Prices Down; Mercury Up 16%

When the Lincoln-Mercury Div. of Ford Motor Co. announced the prices of its 1949 Lincoln and Cosmopolitan lines, they revealed actual reductions under the 1948 model in the Lincoln line, with the Cosmopolitan falling between the previous Lincoln and Continental price levels. However, with recently disclosed Mercury prices showing an increase of about 16 per cent, the effect is to put the Mercury completely out of its previous price range, and in competition in a higher priced field. In connection with prices for the new Lincoln, it must be noted that although the car has a four in. shorter wheelbase, it has greatly increased horsepower and custom trim and appointments at no extra cost, so that on a comparable basis it is actually cheaper than the 1948 model. Prices for the new Cosmopolitan model average about 12 per cent higher than the previous Lincoln model. It has been designed to cover a market between the Lincoln and the Continental models.

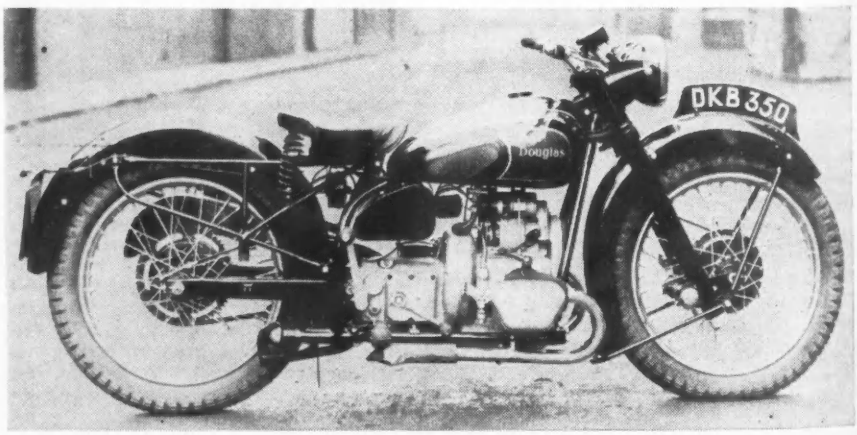
Following are factory list prices:

Lincoln:	**1949**
Sport Sedan	$2395
Town Sedan	2395
Six-Pass. Coupe	2360
Convertible	2760
Cosmopolitan:	
Town Sedan	$2975
Sport Sedan	2975
Six-Pass. Coupe	2925

The 16 per cent boost announced for the Mercury represents dollar increases ranging from $315 to $420 on a factory list basis. The factory list prices follow:

	1949
Sport Sedan	$1875
Town Sedan	1875
Six-Pass. Coupe	1855
Convertible	2225
Station Wagon	2495

The above prices in both Lincoln and Mercury listings do not include distribution and delivery charges, federal and local taxes, or optional equipment. Optional equipment includes overdrive at $97.57, heater at $59.63, and radio, $92.14.



SPEEDY IMPORT

Designed for the U. S. and Canadian markets by Douglas Ltd., Bristol, England, this new Douglas 350-cc de luxe model motorcycle features a full automatic ignition control which eliminates the necessity for hand control. It is powered by a horizontally-opposed, two-cyl engine which is said to make speeds of over 70 mph possible.

NEWS *of the* AUTOMOTIVE INDUSTRIES

East Coast Dealers Get British Fords

Initial shipments of sample models and service parts of English-made Ford cars and light trucks are being delivered to distributors in New York, Washington, Philadelphia, Boston, and Wilmington, Del. Retail prices have not been definitely set, but Henry Ford II stated recently that they probably would be very near to the price of the American product. The two-door model is called the Anglia, and the four-door is called the Prefect. The quarter-ton and half-ton light van trucks are known as the Thames. All are powered by four-cyl engines and develop about 30 hp. The small trucks are slightly larger than the Crosley. Ford has said that about 12,000 of these smaller passenger vehicles and trucks will be made available during the next few months, and sold through a limited number of direct and associate dealers.

K-F Goes on 53-Hr Week to Meet Sales Rise

Sales of Kaiser and Frazer automobiles appear to be definitely on the improved side. In mid-April when production showed signs of falling behind orders, the plant work shift was increased one hour a day to nine hours. That proved inadequate, however, to keep production on a par with orders so the company announced a six-day work week beginning the first of this month. The Saturday work day will consist of eight hours, making a 53-hour work week. The company reports that all dealers now are receiving cars on an allocation basis.

Packard Discontinues Chairmanship

Directors of Packard Motor Car Co. have voted to discontinue the office of chairman of the board. The post was left vacant March 17 when Alvan Macauly retired. New directors elected at the annual meeting of stockholders were W. Tom Zurschmiede, Henry C. Bogle, and Earle C. Anthony. George T. Christopher, president, reported that coke is currently the most serious shortage. He added that Packard now has seven sources of supply for body sheet steel and that suppliers had assured Packard of enough steel for a minimum production of 9000 cars a month, and a possibility of a supply adequate for a production of more than 10,000 monthly. Unfilled orders, he said, numbered more than the company can possibly fill this year.

Studebaker Quarterly Net, $4,250,000

Net profit of Studebaker Corp. for the quarter ended March 31 this year was $4,250,000 on net sales of more than $91 million. In the same quarter of 1947 the company earned $1,655,000. Sales of 58,994 cars and trucks during the first quarter of this year exceeded by more than 11,000 the number of units sold in the same period of 1947.

Trailmobile Gets Broquinda Rights

The Trailmobile Co., Cincinnati, has acquired the exclusive sales and manufacturing rights of the Broquinda Corp., St. Petersburg, Fla., manufacturers of transport refrigeration. Using dry ice as its primary refrigerant, the refrigeration system will be sold under the name Trailmobile-Broquinda Controlled Refrigeration.

British Land Rover Now In Production

Built on the same general lines as the Jeep, the Rover Co., England, has just produced a four-wheel drive general utility vehicle known as the Land Rover. The four cyl, valve-in-head engine, with bore and stroke of 2.74 by 4.13 in., has a compression ratio of 6.8 to 1, and a power output of 50-55 hp at 4000 rpm. The tire size is 6.00 x 16, wheelbase 80 in., and tread 50 in. front and rear.

Babcock Resigns Avco Presidency

Irving B. Babcock has resigned as president of Avco Manufacturing Co., according to Victor Emanuel, board chairman. Mr. Emanuel will succeed Mr. Babcock, who had been president since 1945, and who will continue with the company as a director and consultant.

Soft Ride Heads Wants in Packard Survey

A comfortable ride leads the list of qualities buyers want most in a new car, according to a national survey recently completed by Packard Motor Car Co. Ride was put ahead of such qualities as power, economy, appearance, roominess, dependability, and other factors. Earl H. Smith, Packard experimental and development engineer, said that engineers are working at the rate of 3000 experiments a year in an effort to improve the ride even more, although current cars are at least 25 per cent better in that respect than 1940 models.

LIGHT AND ROOMY

Now rolling off production lines at the Pacific Car and Foundry Co., Renton, Wash., the Carcovan, a new light delivery truck body is built for three-quarter, ton and ton-and-a-half chassis. Featuring a steel channel frame, panelled with aluminum alloy, the Carcovan's payload space measures five ft, 10 in., in height and six ft in width.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Vought to Make Jets in New Texas Plant

The United States Navy has selected the Chance Vought Aircraft Div., United Aircraft Corp., Stratford, Conn., to occupy the Navy industrial reserve aircraft plant at Dallas, Tex. The transfer will require approximately a year's time, but Chance Vought will continue operations at the Stratford plant on a full-scale basis, manufacturing U. S. Navy F4U-5 Corsair fighter airplanes until late in 1948. The company anticipates that operations will commence on a gradually increasing scale in the Texas plant on the production of Vought's newly designed XF6U-1 jet-propelled Pirate, a Navy fighter airplane.

Chance Vought currently employs 8000 workers, and an appreciable number, particularly key personnel, will be transferred to the site of the new operations. The balance of workers needed for full operations will be drawn from the Dallas area. Buildings at the Dallas location contain 2.9 million sq ft of manufacturing and office space, aproximately twice the area of the Stratford facilities.

Du Pont Plans $30 Million Research Expansion

A $30 million expansion of research facilities at the Du Pont Co.'s Experimental Station at Wilmington, Del. has been approved by the Executive and Finance Committees and submitted for ratification to the Board of Directors, the company has disclosed. This is the biggest single laboratory project the company has ever undertaken, and it will reportedly make the Wilmington Experimental Station one of the largest research establishments in the world.

Socony Economist Sees Lubricant Plenty

Plenty of lubricants during the next four years were promised to American industries and motorists by A. J. McIntosh, economist, Socony-Vacuum Oil Co., Inc., New York, who asserted that manufacturing facilities for lubricants will undoubtedly be considerably in excess of demand by 1951. Speaking in Tulsa, Okla., at a meeting of the lubricating section of the American Petroleum Institute, Mr. McIntosh qualified his prediction of plenty of lubricants for the next four years with a statement that the forecasts are based upon a continuation of general peace conditions such as we have now.

Argentina Gets License to Make Derwent Jet

A license for the construction of the Rolls Royce jet engine has been granted the Argentine Government, which will produce the Derwent in the government factory at Cordoba. Already one Argentine jet fighter, the Pulque (Arrow) powered by a Derwent, has flown.

Firestone Gets Third Safety Award

The Firestone Tire and Rubber Co. received its third Award of Honor for Distinguished Service to Safety from the National Safety Council.

PNEUMATIC SEATING

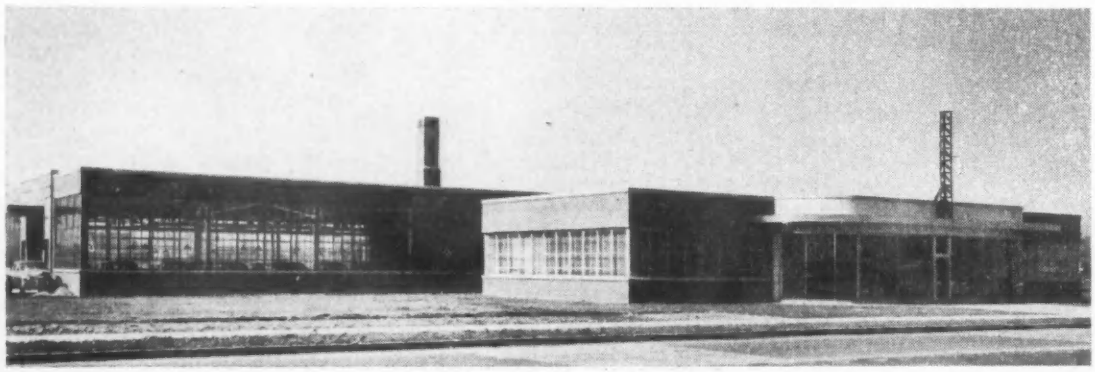
Coming along a conveyor line, shown at the left, seats are installed by means of a pneumatic loader at the trim shop assembly station at GM's Fisher Body Div. in Flint, Mich.

'48 Rubber Act Emphasizes Synthetic Output

Tire and tube manufacturers are adjusting their rubber procurement schedules to conform to the recently-enacted Rubber Act of 1948, which keeps the Federal Government in the synthetic rubber industry for another two years and requires the domestic manufacture and consumption of 222,000 long tons of synthetic rubber each year. The new law requires that U. S. rubber-producing facilities be maintained at a rated production capacity of 600,000 long tons of general purpose rubber and 65,000 long tons of special purpose rubber.

Satellite, New Light Plane, by British Planet Co.

A new unorthodox airplane is expected to fly for the first time very shortly. Named the Satellite, developed and constructed by the Planet Co., England, it is a four-plance light plane with the engine in the middle of the fuselage driving a propeller situated aft of the tail. The airframe is made of magnesium alloy.



PACKARD OPENING

To serve as headquarters for the distribution of new cars, parts and accessories to Packard Motor Car Co. of Canada, Ltd. dealers in Canada, these new $250,000 facilities were formally opened recently by George T. Christopher, president, in Windsor, Ont.

NEWS *of the* AUTOMOTIVE INDUSTRIES

Willys' Six Months Net Is $3 Million

For the first six months of its fiscal year, Willys-Overland Motors, Inc. had a net profit of $3,197,935 as against $1,164,886 for the similar period last year. Gross sales for the half year period were $90,367,747 as contrasted with $64,437,295 for the same period a year ago. Willys-Overland made 72,040 Universal Jeeps, trucks, station wagons and sedans in the period covered.

Dr. Howland Describes New GR-S Synthetic Rubber

Addressing a meeting of the American Chemical Society in Chicago, Dr. Louis H. Howland, head of synthetic rubber research for U. S. Rubber Co., described an improved GR-S type synthetic rubber, with wearing qualities in tire treads which are said to be far superior to those of standard GR-S and equal to or better than those of natural rubber. He said that it is now feasible to make this general purpose synthetic rubber at temperatures between 0 and 40F, as compared with the 122F temperature used before. This sharp reduction in temperature is reported to have increased the rubber's strength 30 per cent, made it much more resistant to flex-cracking, improved its rebound, and reduced heat build-up under flexing, according to tests reported by Dr. Howland.

Sun Oil Plans $16 Million Expansion in Toledo, O.

Expansion of Sun Oil Co.'s Toledo, O. refinery over the next two years at a cost of about $16 million was disclosed recently by Clarence H. Thayer, vice president in charge of manufacturing. The proposed expansion includes construction of an approximate 30,000 bbl-a-day catalytic cracking plant of the most modern design; a crude distillation unit; a vacuum unit; a large gas recovery plant; a new polymerization plant; and auxiliary units and equipment required by the major installations.

Bell Gets Army Order for 70 Helicopters

The Bell Aircraft Corp. has announced that it has received an order from the U. S. Army for 70 two place helicopters which will be assigned to the Army Ground Forces. The company also disclosed the development of a new military helicopter, the XR-15, which is undergoing flight tests. The $2 million Army order for helicopters and spare parts is part of Bell's $16 million backlog, which also includes military research and development work for the U. S. Air Force and Navy, largely of a restricted nature. The 70 Army helicopters will be R-13Bs, which are similar to the commercial model 47-D, except for accessories.

Collyer Predicts 16% Dip In Rubber Used in '48

A dip of 16 per cent in the consumption of rubber in 1948 in the U. S. as contrasted with 1947 has been predicted by John L. Collyer, president, B. F. Goodrich Co. He said, however, that 1948 consumption was expected to be 44 per cent above that in 1940, the peak prewar year. For this year the company estimates consumption of 940,000 tons, against 1,122,000 in 1947, the all-time record year, and as compared with 651,000 tons in 1940. The new B. F. Goodrich Research Center is expected to be in full operation by June 1, according to Mr. Collyer.

Form Rootes Motors Ltd. In Canada

The list of British automobile companies now invading the North American market has a new member, Rootes Ltd. Recently, Rootes Motors, Inc. was established, with headquarters in New York City, for the marketing and servicing of Rootes' products in the U. S. Now Rootes Motors Ltd., a new Canadian firm, has been formed to act as the holding company for Rootes Motors, Inc. and in addition to sell all Rootes cars in Canada. The new Canadian firm is said to be independent of any corporate affiliation with the parent British firm.

Army to Procure Service Motor Vehicles

Continuing its efforts to simplify and improve military procurement procedures, the Munitions Board has assigned to the Department of the Army procurement responsibility for motor vehicles for all the military services. In case of special equipment, an exception to the single procurement responsiblity may be made by agreement between the Dept. of the Army and the service requiring the special equipment.

SAE to Hold Annual Summer Meeting, June 6-11

Tomorrow's trends in automotive engineering will be revealed during the SAE's annual summer meeting to be held from June 6 to 11 in French Lick, Ind. Among the many papers to be presented are a progress report on the dual fuel system as reported by W. M. Holaday, director of the Socony-Vacuum laboratories, New York. Anti-detonant injection of gasoline to better utilize potential power of fuels will be explained by C. H. Van Hartesveldt, Thompson Vita-Meter Corp., Cleveland, and R. I. Potter, Standard Oil Co. (Ohio), will discuss injection for Diesel engines. Highspot of the aeronautic sessions will be a paper on Air Transport Problems by Vice-Admiral Emory S. Land (ret.), president, Air Transport Association of America, Washington, D. C.

Reelect Mooney As Board Member of NICB

At the National Industrial Conference Board's 296th meeting, held recently in New York, James D. Mooney, president, Willys-Overland Motors, Inc. was reelected as a board member.

1948 MOTOR VEHICLE FACTORY SALES FROM U.S. PLANTS*

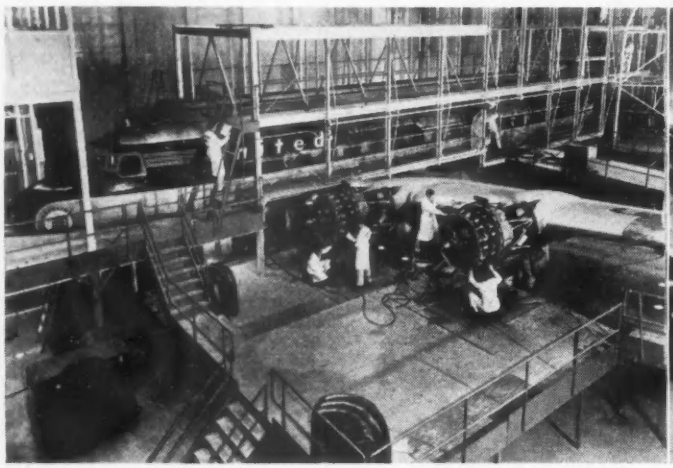
	Passenger Cars	Trucks	Buses	1948	1947
January	305,081	99,200	1,370	405,651	347,696
February	274,847	107,054	1,090	382,991	373,360
March	349,998	140,606	1,409	492,013	421,180
Total—3 Months	929,926	346,860	3,869	1,280,655	1,142,236

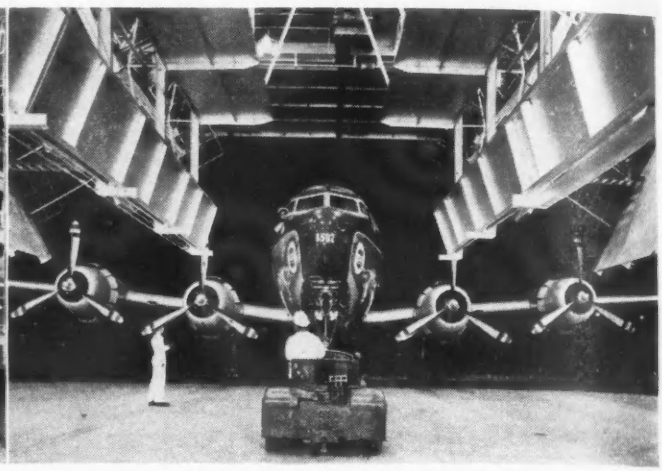
1948 FACTORY SALES TO DOMESTIC AND FOREIGN MARKETS*

	Passenger Cars		Trucks		Buses	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
January	285,373	19,708	83,893	15,307	1,068	302
February	256,753	18,094	88,889	18,165	752	338
March	327,198	22,800	118,572	22,034	1,202	207
3 Months	869,324	60,602	291,354	55,506	3,022	847

*—Automobile Manufacturers Association.

NEWS *of the* AUTOMOTIVE INDUSTRIES





PUSH BUTTON MAINTENANCE

As many as 11 DC-6 Mainliners can be overhauled simultaneously in the huge new United Air Lines maintenance base in San Francisco, Calif. The base covers 116 acres on which there are 700,000 sq ft of buildings. A major feature of the new base is the "push button" dock shown at left in which catwalks are lowered electrically along the plane's sides and a framework is lowered around the entire tail. At the right, a plane is shown drawn by the tractor into the dock with the catwalks in the raised position.

Wright Tests Typhoon, New Gas Turbine

Under secret development for several years, the T-35 Typhoon, a powerful new aircraft gas turbine engine, recently completed successful initial flight tests, according to an announcement by the Wright Aeronautical Corp., engine building division of the Curtiss-Wright Corp. The USAF is still holding as confidential details of power output, type and performance.

Wright has begun production on new order, totaling $3,909,680 for Cyclone 18 engines to be used to power Lockheed Constellations. This is in addition to a $17,518,135 contract granted Wright by the Navy for the latest models of the Cyclone, designated by the Navy as R3350-26-W. It is estimated that this order covers over 400 engines. Curtiss-Wright Corp. was awarded a $1.5 million engineering and tooling contract by the USAF to equip itself for production of the XP-87.

Hiller's New Plant Starts Production

Stanley Hiller's new helicopter production plant has been officially opened for operation at Palo Alto, Calif. The plant will get into production at once on Hiller's new helicopter.

Socony Opens New Research Building in New Jersey

Containing the main laboratories for most of the fundamental research carried on by the Socony-Vacuum Oil Co., Inc., a new Chemistry and Physics Building has been opened at Paulsboro, N. J. This brings the total of buildings in the company's Research and Development Dept. in Paulsboro to more than 12. In addition, it is said to be one of the longest buildings of its type in the United States. The laboratory section is about 52 ft wide and 350 ft long, while the unit containing the main lobby and library is 51 ft wide and 65 ft deep.

Flader Develops New Gas Turbine for Aircraft

Under government contract for the USAF, Frederic Flader, Inc., of Buffalo, N. Y. has developed a powerful new gas turbine engine for large military aircraft. Known as the XT-33-1, it is designed for high power output and low fuel consumption, and is still undergoing tests at the Flader laboratory in Buffalo.

SHIPMENTS OF COMPLETE AIRCRAFT AND AIRCRAFT ENGINES AND OTHER PRODUCTS OF THEIR PLANTS, 1948*

AIRCRAFT

	February	Two Months
Complete Aircraft	613	1,220
Military Aircraft		
Number of Planes	147	283
Civil Aircraft		
Personal Planes		
Number	452	910
Value	$2,145,200	$4,200,955
Transport Planes		
Number	14	27
Value	$2,994,084	$5,492,617
Aircraft Parts—Value	$2,197,677	$3,963,383
All Other Products—Value	$2,848,626	$5,855,309

AIRCRAFT ENGINES

	February	Two Months
Military Engines		
Number of Engines	355	642
Value of Engines	$16,976,065	$32,179,486
Value of Parts	$ 3,528,649	$ 7,211,107
Civil Engines		
Number of Engines	1,007	1,786
Value of Engines	$ 3,562,073	$ 6,711,272
Value of Parts	$ 1,818,472	$ 3,390,658
Total—Engines	1,362	2,428
Total—Value of Engines	$20,538,138	$38,890,758
Total—Value of Parts	$ 5,347,121	$10,601,765
All Other Products—Value	$ 73,488	$ 142,146
Total—Value of All Products	$25,958,747	$49,634,669

*—Bureau of the Census and Civil Aeronautics Administration.

NEWS *of the* AUTOMOTIVE INDUSTRIES

K-F Offers Architectural Service to Dealers

Headed by M. F. Harty, well-known Detroit architect, a new dealer architectural service for Kaiser-Frazer Corp.'s 4000 dealers and distributors has been established, Fred R. Cooper, vice president in charge of sales, said recently. It will provide standard designs for urban, semi-urban and suburban dealer sales and service buildings, flexible enough to meet individual requirements.

Gloster Meteor Is First British Jet Trainer

The first British high-speed jet trainer to go into service is a Gloster Meteor Mark VII, fitted with two Rolls-Royce Derwent engines each of which has a thrust of 3500 lb. Its maximum sea level speed is 585 mph; cruising speed 540 mph; rate of climb 8170 fpm; and absolute ceiling 50,500 ft. It has a lengthened fuselage, pilot and pupil being in tandem behind a single transparent canopy. The cockpit, located forward of the leading edge, as on the Meteor IV, provides an unrestricted view. The pupil is in the forward position. Controls and instruments are duplicated and provision is made for carrying the normal Meteor 180-gal ventral drop tank.

NICB Sees Peak Output for First Half of '48

Fairly heartening news is reported by the latest survey of business practices conducted by the National Industrial Conference Board which said that production is expected to generally continue at or near an all-time peak through the first half of 1948. However, any large remobilization program may markedly affect the business picture. Profits are expected to hold close to the 1947 level, but the majority of executives see little hope of reducing prices with fixed costs mounting and a third round of wage increases possible.

Low Pressure Tires Now Standard on Packard

Extra-low pressure tires are now standard equipment on the new 1948 Packard Eights. However, the wide-cushion tires will not be installed as standard equipment on the heavier seven-passenger sedans, commercial taxicabs, and certain cars for export.

ASME Semi-Annual Meeting in Milwaukee, May 31-June 5

The semi-annual meeting of the American Society of Mechanical Engineers, to be held in Milwaukee, Wis., from May 31 to June 5, will emphasize engineering problems of peacetime application of atomic energy, aviation, fuels, turbines, and rockets. Over 100 authors of papers and speakers are scheduled for the 31 technical sessions.

Name Creamer and Rosen Trustees of NAW

John F. Creamer, Wheels, Inc., N. Y. and Benton H. Rosen, Franklin Supply Co., Providence, R. I., have been appointed by President Frank K. Meyer of the Motor and Equipment Wholesalers Association to serve as trustees to represent the NEWA in the affairs of the National Association of Wholesalers, which was formed a year and a half ago as an organization to represent the interests of principal wholesale trades along lines similar to that of the National Association of Manufacturers.

Tire Shipments Down 14% in February

Manufacturers' shipments of passenger car and truck and bus casings declined 13.7 per cent to 5,106,335 units during February, as compared with 5,919,026 units shipped in January, according to the Rubber Manufacturers Association, which also disclosed that rubber consumption in February was 86,085 long tons, a decline of 14.9 per cent from January's consumption of 101,177 long tons.

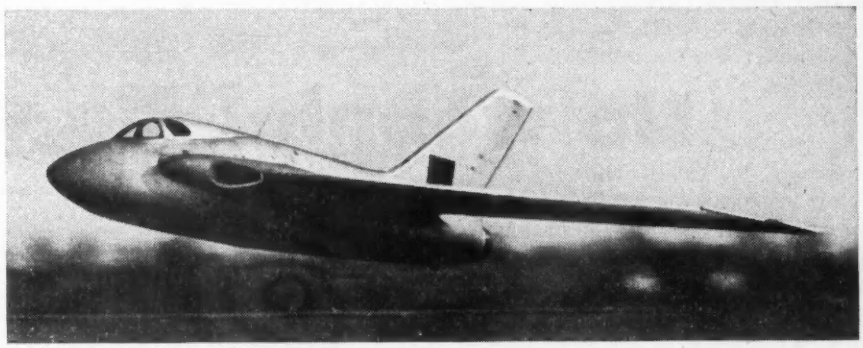
Shipments of passenger car casings amounted to 4,016,756 units in February, as against 4,737,098 units in January. During the same period, truck and bus casing shipments declined to 1,089,579 units from 1,181,928 units. Production of passenger car casings was 5,109,722 in February, against 6,438,955 in January, while truck and bus casing production was 1,275,672 in February, compared with 1,411,967 during the previous month.

First Jet Airliner Flown in England

The first flight of an all-jet airliner was made at Wisley, Surrey, England, on April 6, by a 24-27 passenger Vickers-Viking, powered by four standard Rolls-Royce Nene engines each having a rated thrust of 5000 lb. This airplane is a development of the Nene-Lancastrian which flew in September 1946 with two Rolls-Royce Merlin engines in the inboard nacelles and two Nene engines in the outboard positions.

U.S. Exported 29,500 Vehicles in Feb.

The U. S. exported 15,853 passenger cars during February, to bring the 1948 total to 34,587 units. Exports of trucks and busses amounted to 13,727 for a two-month total of 27,684. During February, the U. S. also shipped abroad $20 million worth of automotive parts, $7 million of which were to be used for assembly purposes.



RECORD SET BY ENGLISH JET

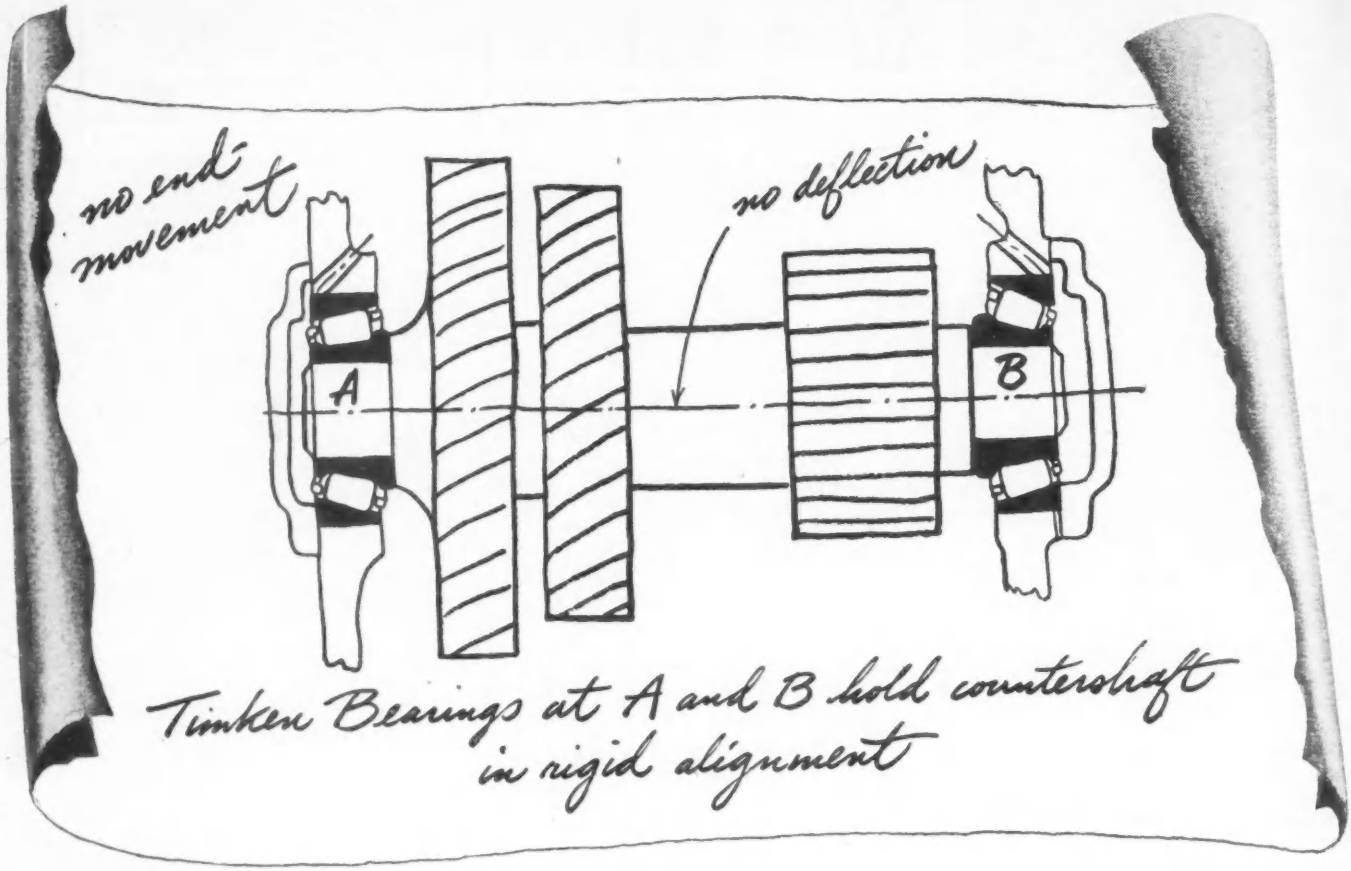
This experimental de Havilland D. H. 108 experimental jet aircraft, powered by a de Havilland Goblin jet engine, recently flew 605.23 mph over a 100 km closed circuit near Hatfield, England, establishing a new international record, subject to confirmation by the Federation Aeronautique Internationale.

569 Personal Aircraft Shipped in March

The shipment of 569 personal aircraft by 13 companies during March has been announced by the Aircraft Industries Association of America. The shipments included 225 four-place planes and 344 two and three-place aircraft, with a total dollar value of $2,181,000 figured at the manufacturers net billing price. In addition, 94 liaison two-place aircraft were delivered to the Army Field Forces in March. The March report compares with February personal aircraft shipments of 13 companies which totaled 441 and which were valued at $1,869,000.

Exports of 47 personal aircraft, four-place and under, valued at $227,451, for the month of March have been reported to the AIA.

(*Turn to page* 100, *please*)



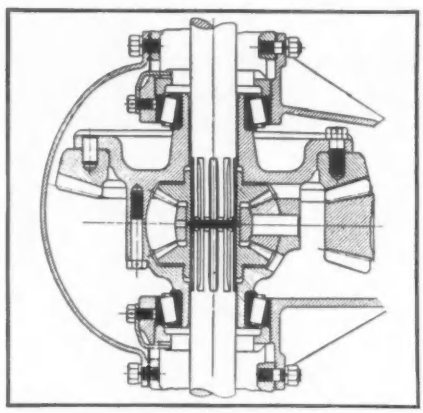
No wobble! No wiggle!

IF you're designing an automatic transmission, the surest way to eliminate deflection and end movement is to use Timken tapered roller bearings on the countershaft. They hold the shaft in perfect alignment, keeping gear teeth in closer mesh. There's less wear on parts . . . extra years of smooth, quiet, trouble-free operation.

The tapered design of Timken bearings permits precise adjustment during installation—machining tolerances of surrounding parts don't need to be as close. And because Timken bearings take both radial and thrust loads, no special thrust bearings or washers are necessary. Designs can be simplified.

They give you the four things you want most in your automatic transmission—quietness, smoothness of operation, long life, and minimum cost!

LOOK AT DIFFERENTIAL MOUNTINGS FOR EXAMPLE . . . Here's another application where Timken bearings have proved their ability to take the toughest loads in any combination. In differentials, wheels, pinions—wherever wheels and shafts turn—Timken bearings mean long life and smooth, dependable performance.



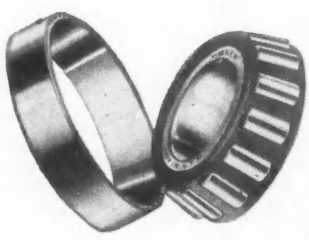
For nearly half a century the Timken Company has been the acknowledged leader in the automotive industry in 1) advanced design, 2) precision manufacture, 3) rigid quality control and 4) special analysis steels. Our engineering facilities are at your disposal when you're designing a new bearing application. In Detroit, phone MAdison 1380. Or write The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

NOTE TO P. A.'S. *Because every step of the manufacture of Timken bearings is controlled within our company...because our vast manufacturing facilities are widely dispersed . . . you will find the Timken Company a supply source of outstanding reliability.*

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION →✳←

Eternal Vigilance Is the Price of Liberty

By

Joseph Stagg Lawrence

THROUGHOUT the literature of authentic liberalism is a dominant and imperative thread, namely, that the price of liberty is vigilance. Providence has been generous to the human race. The gift of freedom is perhaps the most precious of all. Accompanying it is the absolute condition that it must not be taken for granted, that neglect and complacence will bring about its extinction.

A real crisis confronts the world. This country is granting huge sums to help independent nations resist a modern tyrant. The President, in time of peace and during a campaign year, has asked Congress to reinstate selective service and consider universal military training. The purpose is as critical as it is clear. The only doubts are those of adequacy and time.

Here are perfectly-fashioned circumstances to render plausible the demand for a wide range of extraordinary powers. Some of these may be necessary. Many of them will have only a remote and apparent relation to the emergency. Their real purpose will be to enhance the authority and importance of ambitious bureaucrats. "Wrapped in the mantle of patriotism", the political commissars in the nation's capital may tear the Bill of Rights into shreds—and get away with it.

We can expect official spokesmen—aided by massive government propaganda, paid for by the intended victims—to ring anew all the changes on the worn and specious plea that a crisis demands extraordinary measures. At this point the alert citizen will examine every demand for authority with discriminating care. Only those that are definitely related to the problem, whose effects beyond reasonable doubt can justify departure from Constitutional procedure, should be considered. Such authority should be carefully defined and precisely ended.

The automobile industry is undoubtedly an early candidate for these dictatorial embryos on horseback. Allocations, priorities, production schedules, prices and profits will all be wrapped in red tape. The authority of management will be progressively curtailed. Frustration, confusion, waste, delay and inefficiency—these are the inevitable prospects unless the American public has the good sense to perceive and the courage to insist that one of our greatest assets, the private management of industry, must be protected against bureaucratic encroachment.

For it is this management, chosen and tested in a tough competitive market, aided by free workers and shareholders allowed to retain title to their property, which constitutes the greatest single factor of superiority over the prospective foe.

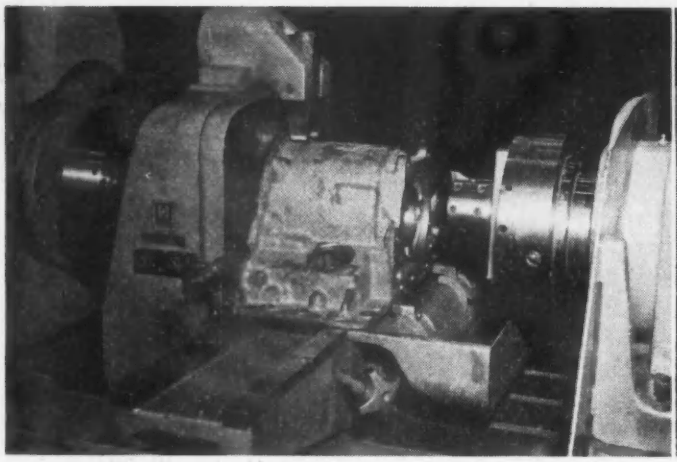
If we forfeit this and submit complacently to the shackles which zealous officials would place upon us, if we can buy nothing except on a ration card, if we can produce only what an arbitrary bureaucrat permits, if we can work only where and when and as told, if we can retain only the income which the state deems adequate, if we can belch only when our leaders have indigestion, then we might just as well get on our knees at once and say "Yes" to Joe. This is the test of our vigilance.

For only so long as freedom remains a force for human welfare, so long will men cherish freedom in their hearts and defend it with their lives.

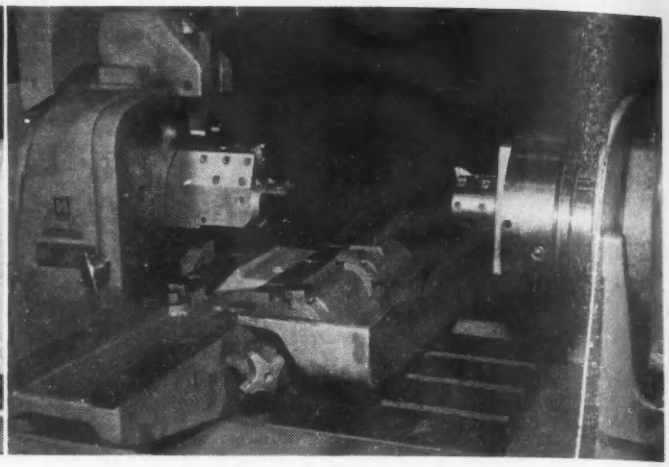
From this fact there is derived the strength of our leadership in the world. From it, likewise, must that leadership be sustained.

We must not let the shape of this present danger (communism), however serious, be allowed to warp or to misshape the foundations and the structure of our own good house.

From address by Gen. Omar N. Bradley, Chief of Staff, U. S. Army, on April 27 to National Association of Magazine Publishers.



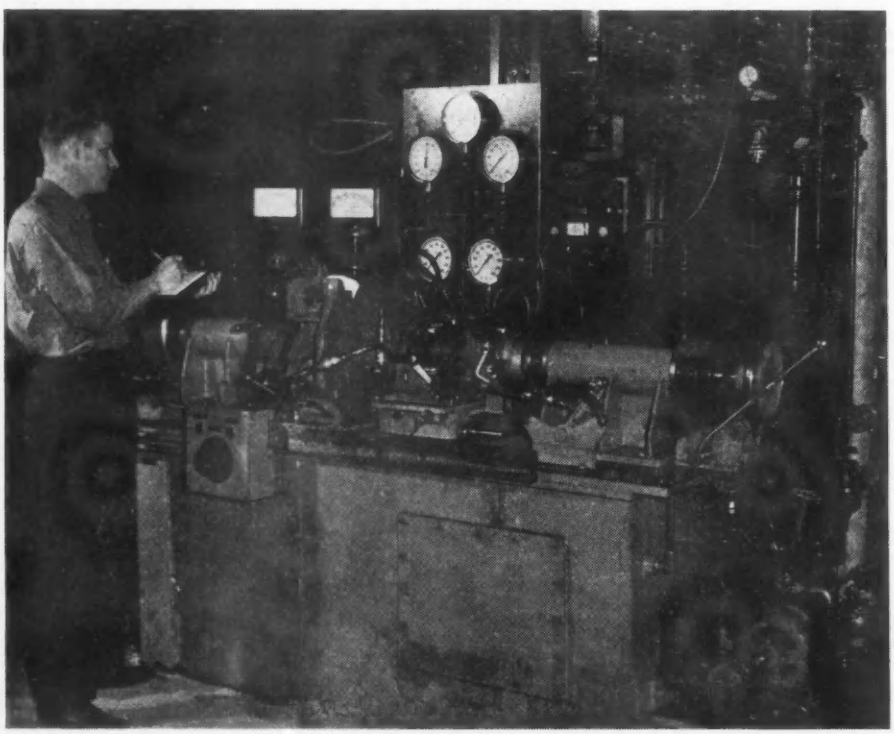
The main bore line of the cast iron transmission case is bored from both ends in this 46-B Heald double-end precision boring machine. In this view the case is seen mounted on the table to illustrate the method of clamping.



Same 46-B Heald Bore-Matic with work removed to show detail of the tooling at both ends to illustrate the complication of stepped bores.

Making the Dynaflow— An Exacting Precision Job

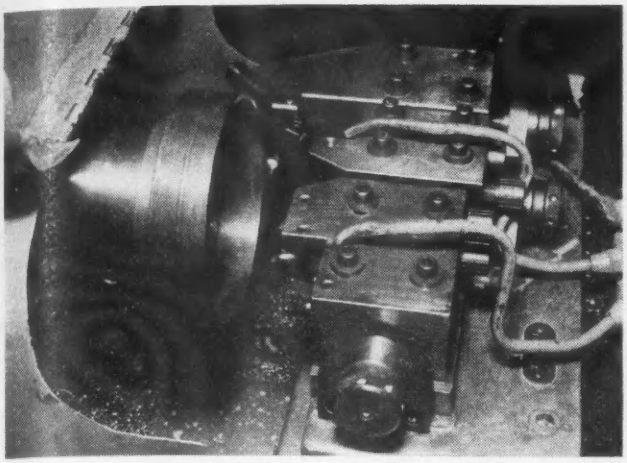
By Joseph Geschelin



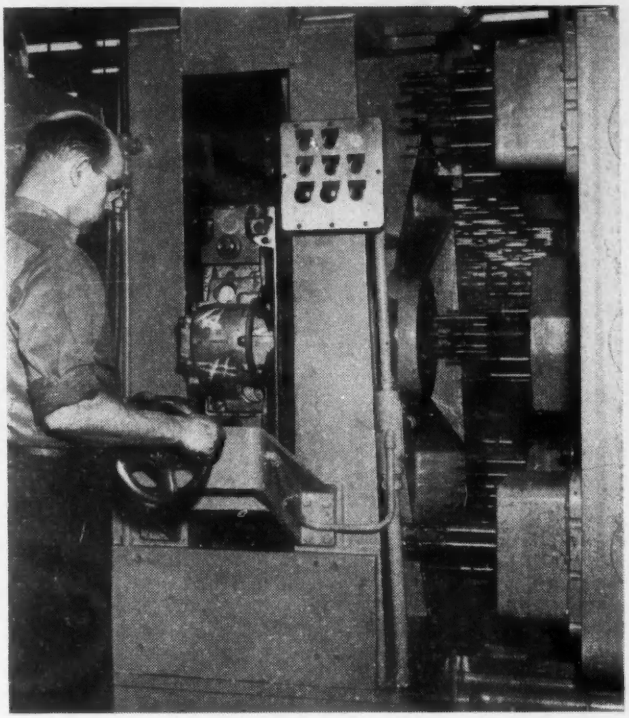
This is the production testing machine for the inspection of assembled Dynaflow transmissions in Plant 10.

THE story of tooling up for Buick Dynaflow production, when it can be fully told, will be an epic of the trials and tribulations of the master mechanic. The program for the making of this unique mechanism had to be studied and developed and special machinery with its tools and fixtures had to be ordered and in the plant within an amazingly short space of time. That these facilities were in actual operation before this article was published may be regarded as a triumph of organization.

Considering everything, the Dynaflow probably represents one of the most exacting precision manufacturing jobs undertaken by a motor car producer. That is not to say that piece by piece the parts require usually fine tolerances, but more dimensions per piece than usual are subject to close control. The real task stems from the fact that the unit consists of a large number of



Various facing, turning, and boring operations on the drum end of the low range reaction gear are done in the No. 2112 Ex-Cell-O single end precision boring machine seen in close-up here.



Fitted with a drum type multiple-station indexing fixture this two-way Greenlee drilling and chamfering machine handles a variety of operations on the transmission case.

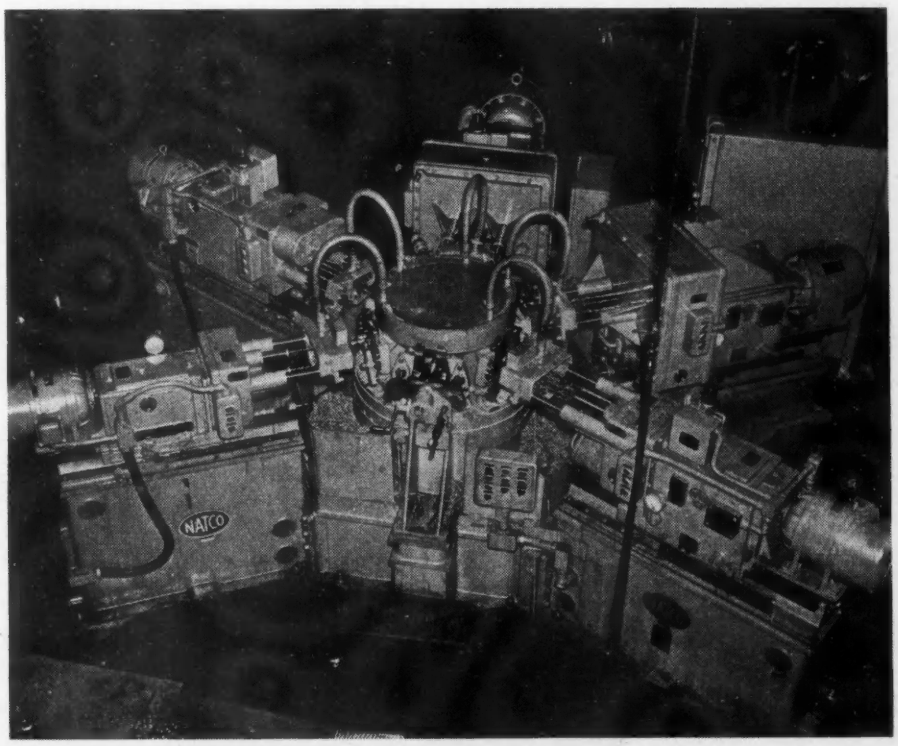
parts—made separately but required to assemble with unerring precision of alignment not only of bores but of flat gasket faces as well.

Since the circulating system of the transmission has oil under pressure of 180 psi during certain portions of the operating cycle, all of the aluminum die castings and cases must be capable of containing such pressure without leakage. That requires, first of all, machined faces and bores free from porosity. It requires also flatness of mating faces approaching the perfection of an optical flat and of correspondingly good surface quality. Moreover, all such mating faces—and there are many of them—must have fine parallelism and squareness with the major axis of the assembly. This is true, too, of elements of the planetary gear set where accurate shaft alignment and positioning of planet gear mounting is imperative.

To meet these rigid requirements by mass production methods Buick has assembled an interesting array of production equipment. For one thing the visitor will be impressed by the imposing battery of Heald and Ex-Cell-O precision boring machines which carry the bulk of finishing operations not only on bores, but for facing large areas, for grooving, step-boring, and a variety of other operations. Another noteworthy feature is the unusually large battery, for an operation of this size, of vertical surface broaching machines of single- and dual-ram type supplied by Cincinnati, Colonial, and American Broach.

The layout abounds in special machines by Greenlee, Natco, Barnesdril, Cross, Bur, and others, and includes other equipment such as Newton mills, Fay automatic lathes, Bullard Mult-Au-Matics.

Because of the variety of parts—and the variety of operations per piece, this article has been confined to



Looking down on the unique five-station Natco horizontal drilling machine which produces the various operations on the rear planet carrier described in the text.

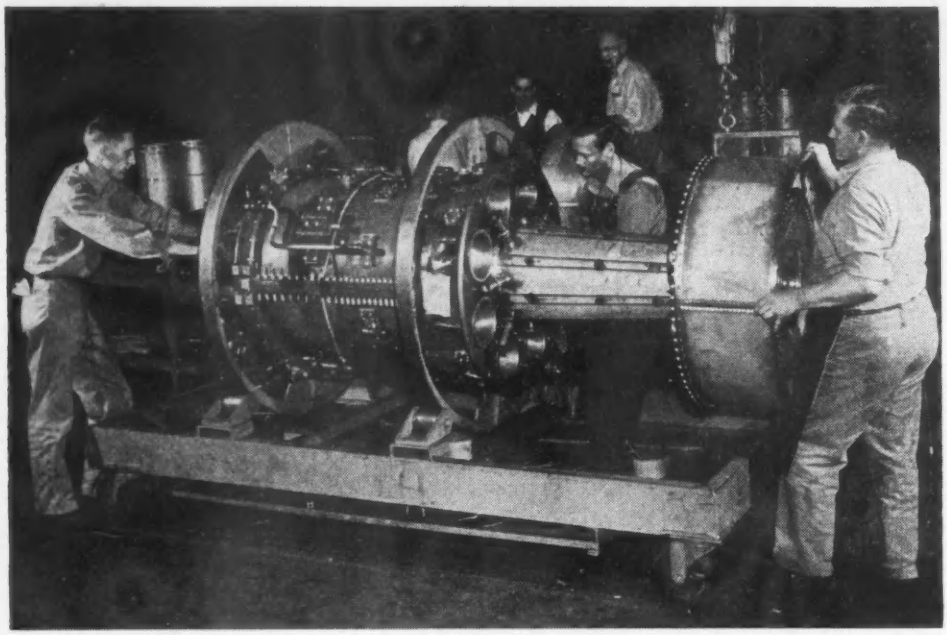


Fig. 6 (Top, right)—Close-up of one of the final assembly stations on the green line. Here may be seen the method of installing the aft frame section.

a sampling of just a few operations on a selected group of parts and, consequently, does not pretend to cover the gamut of interesting metal cutting procedures.

The transmission case goes through an extensive sequence of some 220 operations starting with milling in special Newton mills, and rough-and-semi-finish boring in six-spindle, Type D Bullard Mult-Au-Matics. Sandwiched in the routing is a Greenlee one-way, 24 in., horizontal five-station automatic indexing machine for drilling and chamfering in the bottom face; and a Greenlee two-way, horizontal six-station machine with automatic indexing for drilling and chamfering at the front and rear faces. At Operation 120 is found a new Cross tapping machine of way type for tapping a variety of holes. Finish-milling of the bottom face is handled in a Sundstrand fluid-screw Simplex Rigidmil.

The machining of this part is done on one of the Heald precision boring machines mentioned earlier. This is a 46-B Heald double-end Bore-Matic extensively tooled for the following operations:

Finish-bore 6.625-6.626 in. diameter and 2.4995-2.5005 in. diameter.

Finish-bore and face 6.470-6.475, and 4.8765-4.8785 diameter and chamfer.

Finish-face and chamfer $5\frac{3}{8}$ in. diameter and $3\frac{1}{3}$ in. radius.

The machine is fitted with a single station angle type work holding fixture which clamps the work and transfers it from one station to the other in an automatic cycle. It has a total of 15 cemented-carbide tipped tools.

The reverse brake band anchor strut is a rather small and relatively minor part. Ordinarily this part might be cut off from specially formed rolled stock. But with things as they are, a manufacturer is obliged to forget about the short cuts possible with rolled steel forms. Instead, this part is formed from flat stock by surface (*Turn to page* 88, *please*)

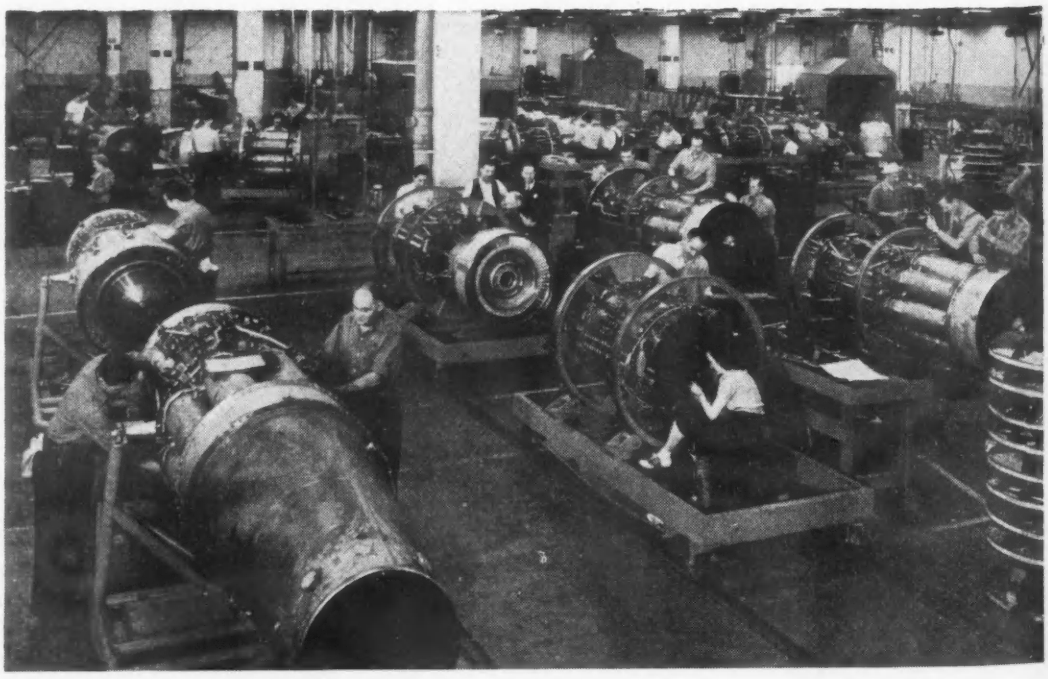


Fig. 7 (Lower, right) — General perspective of the assembly department showing J35 turbo-jet engines in various stages of assembly.

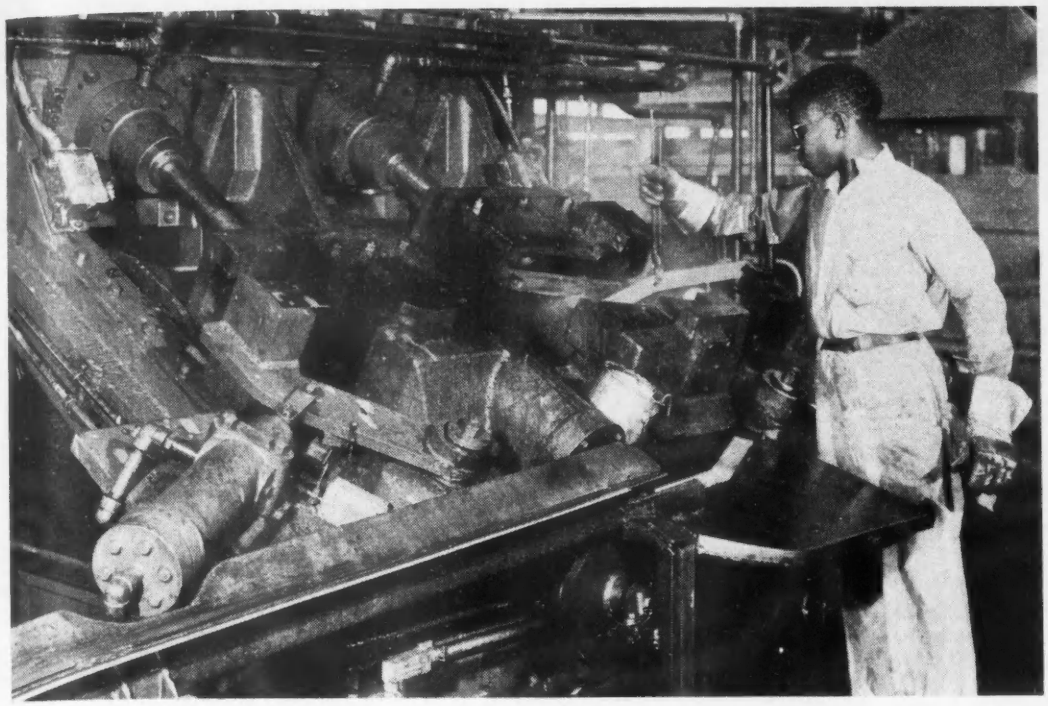


Fig. 1—This is the special bending machine for form-bending of bumper bars. The V-shaped trough in the foreground is the guard for the power driven conveyor that carries the work through the oil quench.

Oldsmobile Organizes Bumper Bracket Setup

IN line with recent expansion activities at its forge plant, Oldsmobile has set up a new department for the fabrication of hotformed and heat treated secondary bumper bars. The outer bar or bracket, 1¾ x 9/32 x 18¾ in. long, weighs 2.63 lb; the inner bar is 1¾ x 9/32 x 25⅝ in. long and weighs 3.17 lb. The major steps in the fabrication of these parts together with a few pertinent illustrations are given here.

The first operation is punching and shearing of blanks from bar stock, followed by edge bending in an inclinable press. For edge bending the blanks are heated to 1800 F.

The next major operation is shaping to form in the special forming machine, Fig. 1. In preparation for forming the blanks are loaded into a high heat walking beam conveyor type furnace and heated to a temperature of 1600 F. As shown in Fig. 1 the formed blanks are dropped onto the power driven conveyor in the foreground which carries them through an oil quench tank and then discharges onto the apron of the draw furnace. The temperature of this furnace is held at 950-1050 F.

Upon completing the cycle in the draw furnace the parts go through a water quench tank and are discharged by the draw furnace conveyor to the last station—Fig. 2—where the parts are gaged and racked for shipment to the assembly department. It is of interest to note that the solution in the water quench tank contains an inhibitor to prevent rusting.

Fig. 2—Final operation—gaging and racking for shipment—is handled at the exit end of the draw furnace as parts emerge from the water quench station.

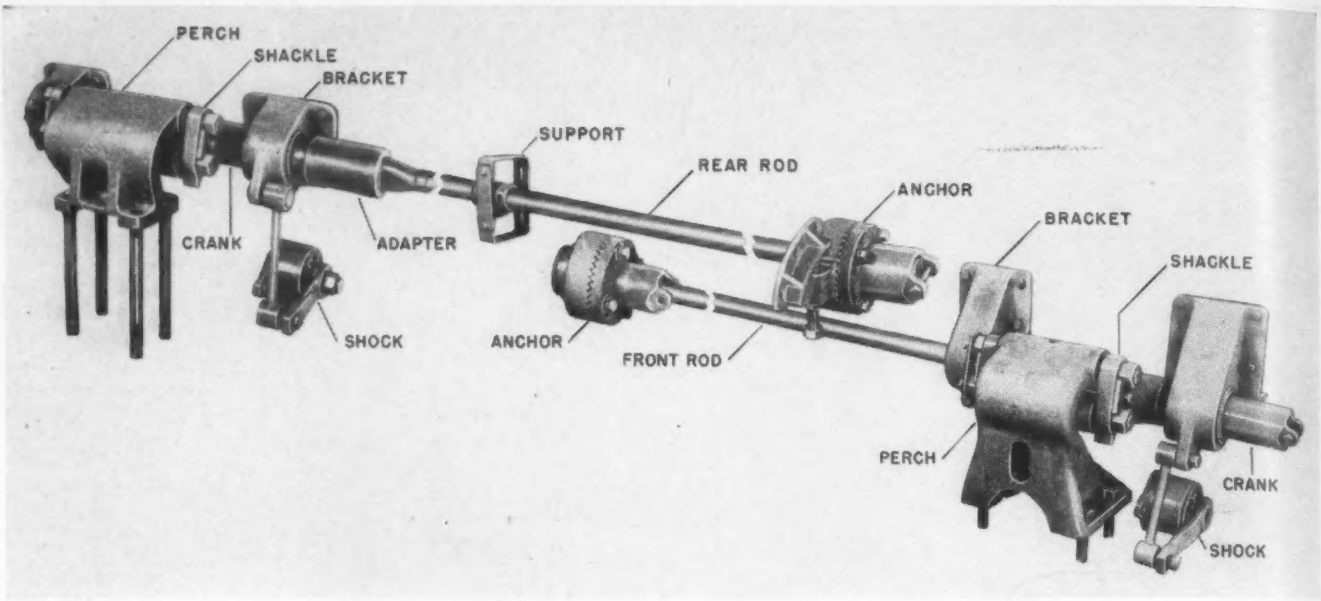


Fig. 1—Complete "Gravity Spring" torsion-rod system for the right side of a bus.

Improvements in Steel Torsion Rod Springing

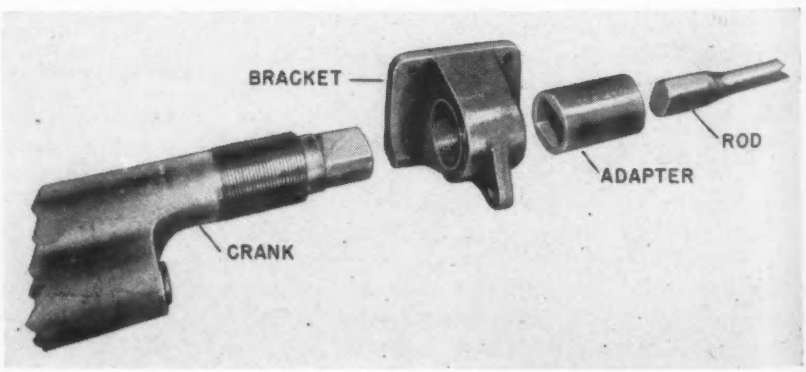
By H. E. Simi
Manager, Bus Division,
Kenworth Motor Truck Corp.

AN IMPROVEMENT in riding quality of buses has been achieved with a new and more easily serviceable application of the "Gravity Spring" torsion-rod suspension system. The former method of steel torsion-rod springing, which used plain bearings, adjustable thrust washers and grease seals, has been simplified by the use of threaded type bearings similar to those used successfully for many years at the ends of leaf springs. The threaded shackle pin and bushing is not only an excellent bearing with the right amount of friction for torsion spring suspension, but it eliminates the need for thrust adjustment and seals. Each thread forms a thrust shoulder, and also discourages the entry of dirt and moisture. Noise does not develop in the journals irrespective of the clearance because the mating threads always remain in close contact with each other under all conditions of spring action. The threads are excellent for retaining lubricant, and therefore do not require grease seals, producing more uniform spring action and lower maintenance cost.

A complete assembly of the new "Gravity Spring" suspension system, including all the parts required on the right side of a typical bus installation, is shown in Fig. 1. Sections of the rods have been omitted in order to condense and clarify the detail in the illustration. The nomenclature of the suspension is indicated to expedite explanation.

The perch is substantially bolted to the axle as close to the tire as possible in much the same manner as leaf springs are mounted. The crank which is supported

Fig. 2—Expanded view of the crank, bracket, adapter and torsion rod.



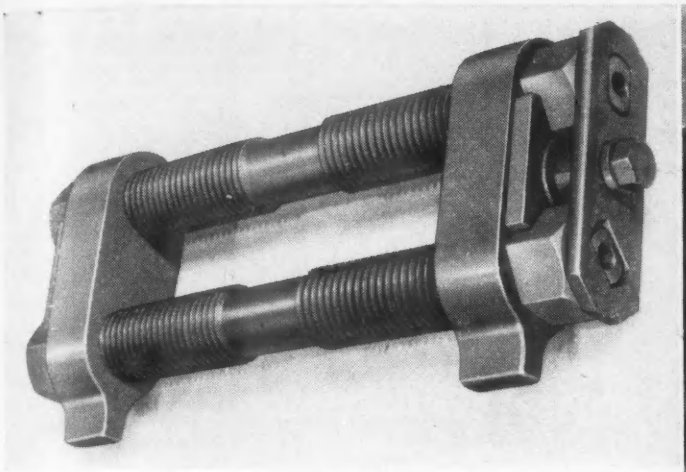


Fig. 3—Shackle and pin assembly of "Gravity Spring" system.

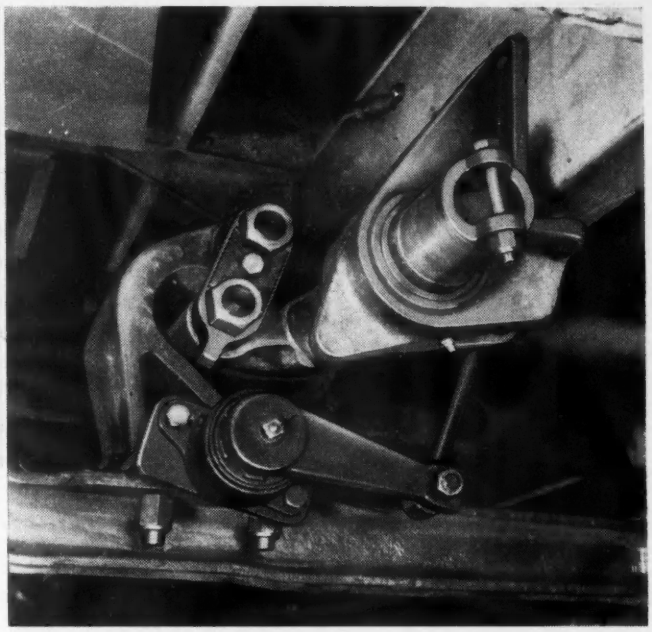


Fig. 5—Typical application of spring at front end of bus.

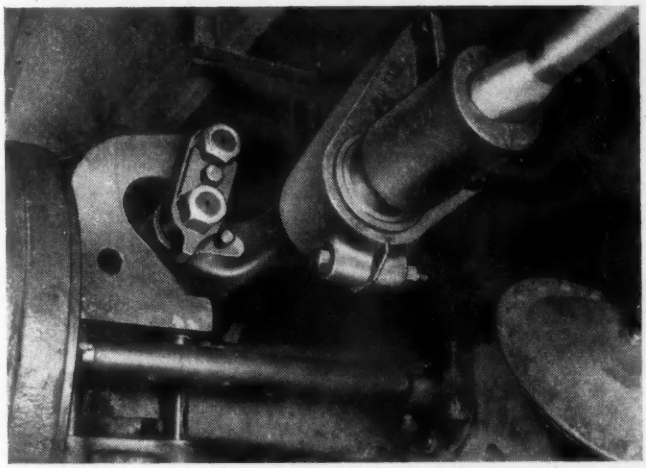


Fig. 4—Typical application of the torsion-rod spring at the rear end of a bus.

on the chassis frame in threaded bearings by the brackets is the lever that twists the torsion rod when the load is applied. The shackles which attach to pins working in threaded bearings permit free vertical, lateral, and angular movement of the axles at all times. The spring rod engages the crank by means of an adapter, which is a simple casting with oblong sockets at each end to fit the flattened ends of the crank and rod. The center of the spring rod is steadied by the support, which consists of a rubber sleeve and strap surrounding the rod approximately at the center.

The anchor parts of the rod include the screw adjustment arrangement, and the 360 deg adjustment which has cast teeth. This end of the rod is rigidly fastened to a substantial part of the chassis frame structure. When the amount of adjustment needed exceeds the length of the screw, additional screw length is provided by moving over one tooth. When the springs are adjusted to the proper level at the factory, additional adjustment will be very nominal and infrequent.

The shock absorber is of the double acting type and is used front and rear for proper control. The shock absorbers are positioned to snub lateral as well as vertical movement.

Fig. 2 illustrates an expanded view of the crank, bracket, adapter, and rod. The threaded case hardened steel sleeve which is press fit and welded to the end of the crank engages with the threaded case hardened steel sleeve which is also press fit and tack welded to the frame bracket. Four pairs of these large threaded bearings are used per axle and eight pairs per bus. Although bearings of smaller size could be used at the front axle due to the lighter loading, they are all the same size because of standardization.

Fig. 3 shows the shackle and pin assembly that engages the perch and crank. The pins are threaded case hardened steel and work in threaded case hardened steel mating bushings which are press fit and tack welded to the perch and crank. Wrench type locks provided at the ends of the pins keep the nuts and pins from turning. The pins are drilled for alemite lubrication. The shackles are machined from hot-rolled steel bar stock for maximum density of structure. All the cast parts used in the torsion rod "Gravity Spring" suspension illustrated here are cast steel for reasons of strength and weldability.

A typical application of the spring at the rear end of the bus is illustrated in Fig. 4. This view shows the proximity of the perch to the brake drum, the relatively high position of the perch necessary for zero body roll, and the clearance in the perch for ample lateral movement of the axle. The shackles on one end of the axle are not parallel with the shackles on the other end but converge upward as illustrated. When the body moves to the side on turns, due to centrifugal force, the shackles on the outside of the turn move toward the pocket in the perch, causing the crank to climb sharply and to lift that side of the body which is toward the outside of the turn. The crank on the other end of the axle follows the arc of the shackle downward and further accentuates the inward inclination of the body on turns, thereby permitting greater vehicle speeds with entire safety. The action

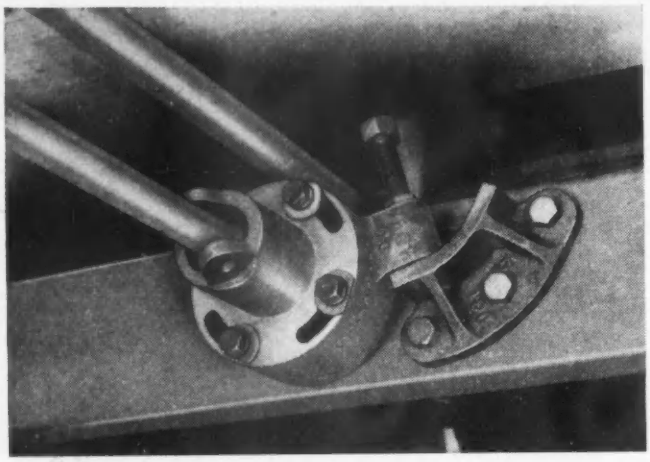


Fig. 6—Rod anchor mounting.

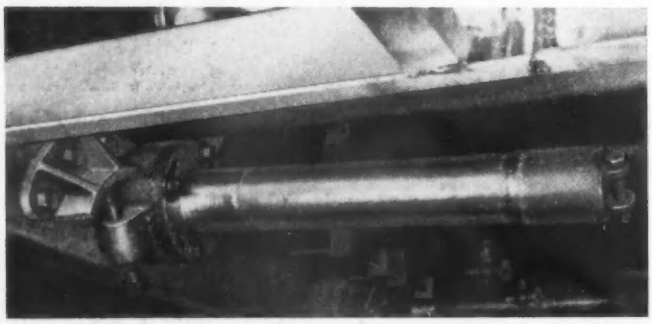


Fig. 7—This photo shows how a rod anchor ca nbe extended to reach an adjacent crossmember.

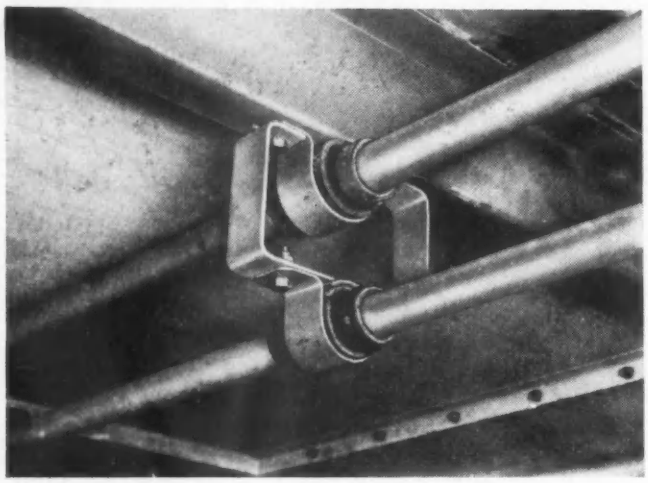


Fig. 8—One type of center support arrangement for the rods. This support acts as a steady rest to prevent the rods from shaking around.

of the spring rods during such periods is comparable to the action of antisway bars on automobiles.

The lower end of the shackle is extended to engage against a heavy pin or projection on the crank to prevent the linkage from jack-knifing the wrong way in periods of extreme bump or when the vehicle is lifted clear of the ground without support under the axles.

Fig. 5 shows a typical application of the spring at the front end. The spring rod in this case projects through a hollow crank and is locked in position by

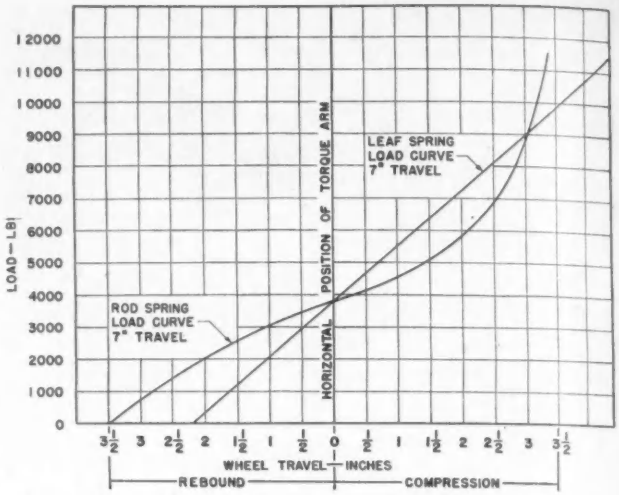


Fig. 9—Comparison of convntional leaf spring and torsion-rod "Gravity Spring" is obtained with load curves of both types. Wheel travel in inches is plotted against load in pounds.

the bolt at the end of the crank. When space conditions permit the installation of the rods without interference with other chassis parts, it is not necessary to use hollow type cranks. Hollow cranks are sometimes preferred to provide better space for the rods, which range from 10 to 14 ft in length. A hollow crank can be extended with a sleeve to further reduce the projection of the rod in the opposite direction when clearance requirements so dictate.

A typical mounting of a rod anchor is shown in Fig. 6. The corresponding anchor on the opposite side of the chassis counteracts the torque of the anchor illustrated and thereby greatly simplifies the chassis design problem.

Fig. 7 shows how a rod anchor can be extended to reach an adjacent crossmember when a crossmember directly at the end of the rod is impractical, thus making the rod spring very versatile in its application. Seldom is serious interference encountered which prevents the rod's location in the normal positions. In such cases transfer linkages can be used to transmit the load from the crank to an auxiliary shaft, which in turn connects with the rod. If circumstances should require it, all four torsion rods could be grouped in any part of the vehicle, even on the roof if connected with transfer linkages to the various cranks, and if anchored in the structure sufficiently to resist the loads imposed. Unusual arrangements of transfer linkages are not recommended, however, because of the penalty in cost and weight as well as the objectionable condition of friction that may be introduced.

One type of center support arrangement is shown in Fig. 8. The support acts only as a steady rest to prevent the rods from shaking around and bumping adjacent structure. Although spring rods of this type are not exactly straight as manufactured, they do not need to be pulled into perfect axial alignment, but only need to be held in their normal positions. When flattened end type spring rods are used as illustrated here, the rod ends and sockets provide sufficient universal joint action to permit the rods to be mounted

(*Turn to page* 86, *please*)

How Helping Europe Will Affect Our Economy

Preliminary Estimates Indicate Little Increase in Export of Trucks. Pronounced Effect on American Domestic Goods Supply to Come from Use of Iron and Steel to Build Machinery for Shipment Abroad

By Karl Rannels,
Washington Bureau,
Automotive Industries

ONLY a moderate increase for the export trade of motor truck manufacturers is now seen for the first 15 months of the European Recovery Program's operations, even should all presently estimated needs be fulfilled. The requirements of the participating nations for this initial period of the four-year plan have been tentatively set at about 51,825 trucks. Comparatively, this is a little less than a fifth of the total 1947 United States exports, which amounted to about 263,000 units.

Thus, the potential new market represents roughly about four per cent of last year's production and an additional 20 per cent in potential new trade. The effect, however, will probably not be felt within the manufacturing field for some months to come. Although original plans had been to ship upwards of 10,000 trucks to Western Europe during the first three months of the program—April, May and June—it is doubtful if the first shipments leave American docks until after the beginning of the last half of 1948.

Also, the United States is expected to provide a quantity of miscellaneous vehicles. An allowance or estimate has been made that this phase of the program will involve about $41 million. Total cost of the trucks, based on 1947 prices, is placed at about $75 million.

The Economic Cooperation Administration's immediate attention is concerned with so-called relief shipments—chiefly food and other agricultural products. These are the only goods for the program which will be purchased by governmental agencies; in addition, these have been the only commodities of which considerable quantities were both available and ready for shipment.

On the other hand, heavier types of goods such as iron and steel, trucks, machinery and other equipment intended for assisting foreign economic recovery will be procured by agents or agencies of the importing nations. These will be placed directly with the manufacturers after verification or screening by the ECA. Not only will this processing by ECA require some time but an additional period must be allowed the manufacturer to prepare and deliver such orders to the ports.

Under present arrangements, the Netherlands and its dependencies have been allotted the greatest single amount of trucks—15,450, of which 4000 were originally scheduled to have been shipped before June 30. Other tentative first year needs are: Sweden—8100; Denmark—7500; Germany—6250; Greece—4875; France—3700; Austria—2500; Norway—1625; Ireland—1250; and Iceland—675. Six participating nations are omitted from the calculation of trucking needs for inland transportation. These are Belgium-Luxembourg, England, Turkey, Portugal and Italy.

These estimates, of course are only tentative and are subject to revision as the program advances. Paul G. Hoffman, ECA director, said that the ECA expected "to make full use of advisory committees" from industry and other segments of the economy in carrying out the program. "Present figures," Mr. Hoffman added, "contain a high element of guesswork in them. They are the best available and have been given the Congress as part of the justification for appropriating the necessary funds."

In some instances, one ECA official said, in cases such as in Italy with its mountainous terrain, shipments of horses and mules would probably be more practical if inland transport needs to be bolstered; in others, water-borne transport will be supported and fully utilized. In the case of Germany, with its miles of autobahns, it might be necessary to revise the estimated trucking needs upwards as rehabilitation progresses.

The effect of the ERP on American industry from actual truck exports is likely to be less than the use of basic materials to manufacture other types of heavy goods, such as machinery and equipment, which are considered as essential to European recovery. It is estimated that 2.4 million metric tons (about 2.6 million short tons) of iron and steel mill products will have to be supplied to Western Europe between now and June 30, 1949. This tonnage will roughly consist of 500,000 tons of crude and semifinished steel and 1.9 million tons of finished steel. These figures are not necessarily commitments but represent the difference between the anticipated European consumption of 41.4 million tons and expected European production of 39 million tons.

Actually, these export estimates do not vary greatly from actual shipments abroad last year. Exports of crude and semifinished steel averaged about 87,000 tons per quarter in 1947 (*Turn to page* 88, *please*)

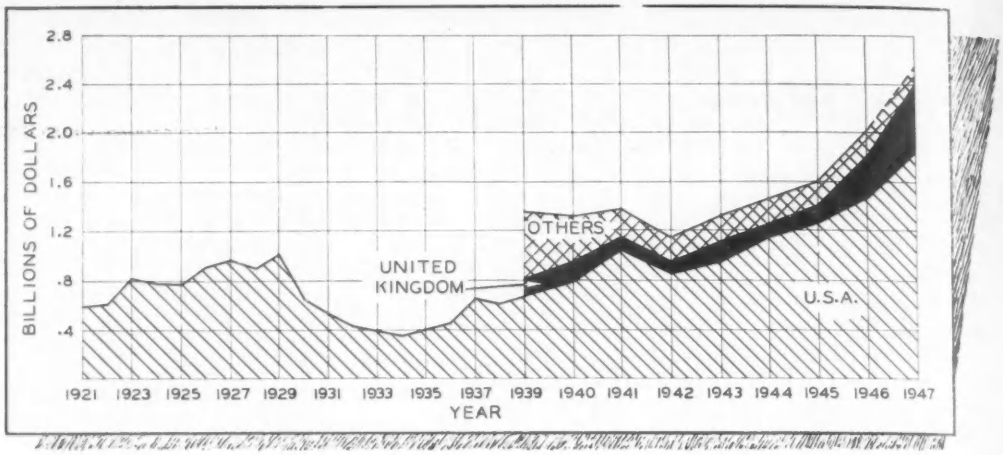


Fig. 1 — Source of Latin American imports. (Ref. U. S. Dept. of Commerce)

Our Future Export Market

IN SPITE of the present dollar shortages in Latin America, long range prospects are favorable for increasing our export trade with that area. This optimism is based on three major factors. First, Latin American exports of foodstuffs and raw materials are vital to the success of the European Recovery Program. Under the present plan, the other American republics will export about $1½ billion worth of materials during the coming year. Most of this will be paid for with dollar credits permitting Latin America to step up purchases in this country. Secondly, the U. S. is committed to a program of aiding the economic and military preparedness of Latin America. The recently signed Hemisphere defence treaty will be highly effective in introducing American methods and techniques among the southern republics, resulting in closer trade relations in the future.

Finally, most of the Latin American goverments are embarking on long range industrialization programs aimed at strengthening national economies and raising standards of living. In general, these programs call for the establishment of a basic steel industry, the development of existing metal working industries, and the expansion of transport and power facilities. Inevitably, the greater part of these requirements will be supplied by industries in this country.

TABLE I. U. S. EXPORTS OF AIRCRAFT, PARTS AND ACCESSORIES TO LATIN AMERICA

(Millions of Dollars)

Principal Purchasers	1937	1938	1939	1940	1946	1947
Argentina	4.4	6.2	2.2	.05	4.2	16.5
Brazil	1.7	1.9	1.9	1.9	7.8	10.3
Mexico	1.9	1.2	3.2	0.6	6.6	5.0
Colombia, Peru & Venezuela	1.6	1.4	2.3	0.7	5.4	5.8

Ref. U. S. Dept. of Commerce.

TABLE II. COMMERCIAL AIRCRAFT BEING USED BY MAJOR LATIN AMERICAN COUNTRIES IN 1947

Argentina	51
Brazil	115
Mexico	51
Peru	18
Uruguay	12

Ref. CAB Economic Bureau.

TABLE III. U. S. EXPORTS OF AUTOMOTIVE EQUIPMENT TO LATIN AMERICA IN 1946

Principal Purchasers	New Passenger cars	Unassembled auto parts	Auto Accessories
Mexico	$937,398	$11,507,707	$860,740
Brazil	347,755	8,867,842	670,826
Argentina	100,464	7,358,882	213,392
Venezuela	223,972	2,671,379	189,993
Colombia	334,644	2,377,383	221,201
Peru	78,818	969,032	102,009
Bolivia	80,698	229,690	11,596

Ref. U. S. Exports of Domestic & Foreign Merchandise. U. S. Dept. of Commerce.

Why Industrialize?

Why has our State Department endorsed these plans for diversifying production? Won't our own trade be cut off if these countries achieve industrial self-sufficiency?

Let us examine the record. Traditionally our neighbors to the south have been large-scale producers of foodstuffs, minerals and other raw materials. With few exceptions, existing industries have been chiefly concerned with the processing of these materials for overseas shipment. Moreover, production in any one country was concentrated on those items most easily produced: Bolivia, tin; Chile, nitrates and copper; Colombia, coffee; Cuba, sugar; Vene-

Increased Demand for U.S. Automotive Products and Machine Tools Comes About As Result of Industrialization of Latin American Countries

By George M. Galster

in Latin America

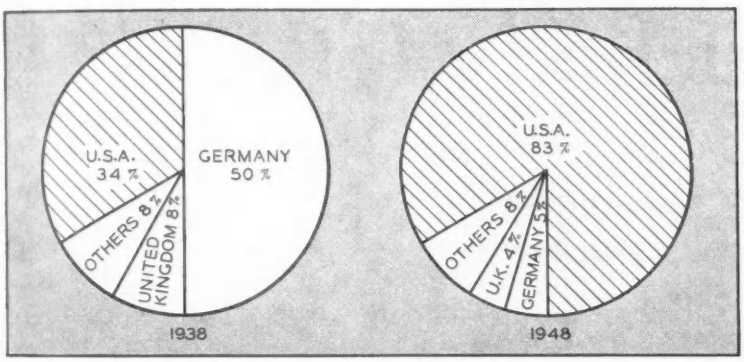


Fig. 2—Source of Latin American machine tool imports. (Ref. U. S. Dept. of Commerce)

zuela, oil; and so on down the list. Lacking financial reserves, these countries have had to sell their products regardless of conditions in the international commodity markets.

Two world wars and the depression of the thirties severely damaged the economic life of these countries. Economic disturbance in its train brought political upheavals and eruptions of communist activity. It is not surprising, therefore, that efforts are being made to diversify production, stabilize currencies, and generally strengthen the economy of Latin America.

Naturally, this program will affect our export trade, but only in character, not in volume. Before the war, the United States had already lost most of its Latin American markets for leather goods, textiles and pharmaceuticals. Yet these losses have been more than recouped in the increasing demand for office machines, electrical apparatus and other capital goods. (See Fig. 1).

Actually, under normal conditions, major currents of international trade flow between the highly industrialized nations. Great Britain, for example, has always been our best customer for certain types of manufactured goods. Even the United States is the world's greatest export market for nearly 100 countries, in spite of our degree of so-called self sufficiency. In the final analysis, a nation's ability to buy is proportional to its national wealth . . . in these days wealth created by coordinated and efficient industrial production. And that is the goal that Latin Americans are striving for.

Looking at this from one other angle, statistics show that more than half of the return on U. S. foreign investments now comes from Latin America. This amounts to about $400 million annually on a total investment of around $3 billion. "Yankee imperialism" is no longer a popular term south of the border. Latin Americans are beginning to realize that foreign capital receiving fair return is an essential part of their present industrialization program.

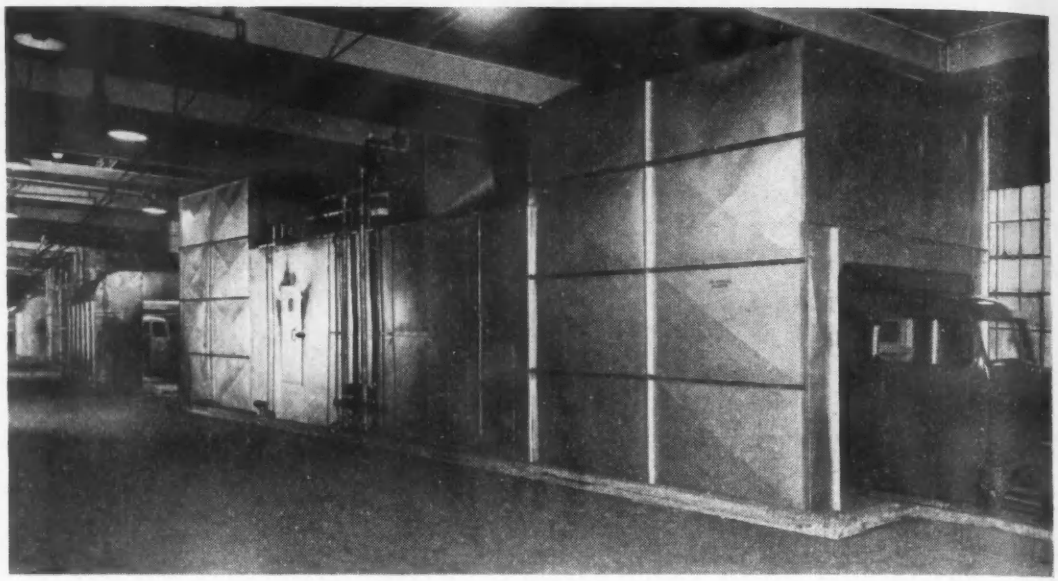
Transport Expansion Vital

Without a doubt, adequate transportation is one of Latin America's greatest needs. This was true when the Conquistadores wrested the land from the Indians, and it is even more evident today.

Argentina, Mexico and Chile have the only railway systems anywhere near adequate. Rail facilities in other areas are generally short disconnected lines, severely handicapped by antiquated rolling stock, motive power and maintenance equipment. Some attempts are being made to integrate existing rail networks, but the multiplicity of track gauges is hindering the work. (About 23 per cent of the total mileage is U. S. Standard gauge, 1.436 meters; 39 per cent is one-meter gauge; while the remainder uses 1.678, 0.914 or 0.60 meters.) Because of these conditions, few extensions or improvements are planned in this field; instead, emphasis is shifting to the more versatile air and highway transport.

Airlines Expanding

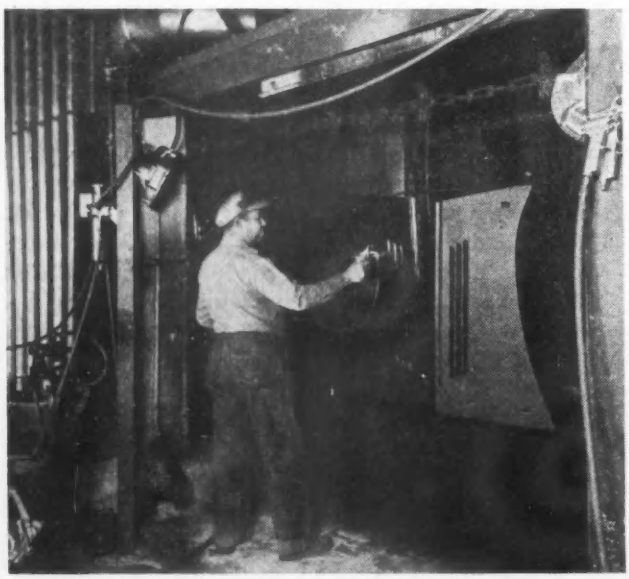
Commercial air services are expanding faster in Latin America than in any other world area. Yet cargo potentialities in most countries have barely been tapped. The present airline network south of the border actually exceeds the total U. S. domestic mileage, but flight frequency is less due to poor meteorological (*Turn to page* 70, *please*)



Perspective view of spray booth and drying oven installation on the Federal cab line. The scene opens at the extreme left where cabs-in-white enter the first spray booth for surfacing, then a drying oven. Cabs continue on the conveyor through the second spray booth and the second drying oven in the foreground. The group of spray booths and drying ovens was installed by Newcomb-Detroit.

Making Heavy Duty Trucks by Mass Production Methods

Latest Mechanized Equipment Such As Power-Driven Assembly Lines and Monorail Conveyors, are Modern Operations at the Federal Plant in Detroit

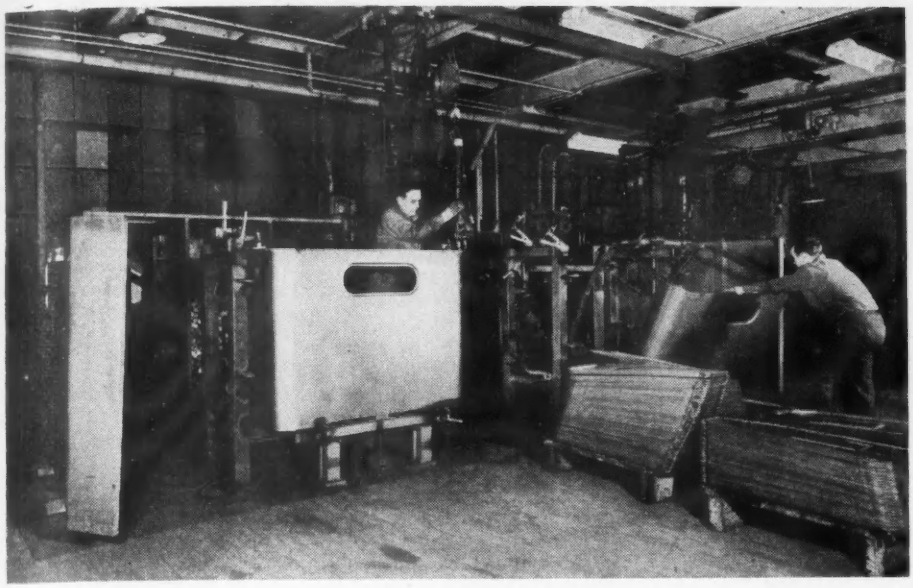


Part of the paint shop setup on the first floor for finishing miscellaneous sheet metal parts. This is the interior of one of the Newcomb-Detroit spray booths. The parts travel on a continuous conveyor line in their trip around the paint shop and out to storage or points of usage.

ALTHOUGH considerable attention has been given to fabrication and materials handling procedures in passenger car plants and in the mass production industries in general, it is perhaps not so well known that producers of heavy-duty trucks have made considerable strides in the adoption of mass production methods, necessarily on a relatively smaller scale. The plant of the Federal Motor Truck Co., Detroit, illustrates this point.

This company has mechanized its operations to the same degree as do passenger car plants, despite the fact that its production is devoted exclusively to heavy duty vehicles. The assembly lines even for the largest models are power-driven and feature heavy-duty conveyors of the most advanced type. Monorail conveyors are employed extensively for linking process operations and for distributing sheet metal to various departments.

In addition Federal has had in operation for some time a completely mechanized setup for the fabrication and finishing of its cabs. The cab line embodies the latest techniques used in steel body building and features drying ovens of the latest type known to the



Activity in the cab department at the welding stations. Here may be seen the preparation of sub-assemblies for the cab, built up in massive steel fixtures.

art. Building of cabs is described in the following outline:

1. Preparation of stampings and structural forms in the press shop.
2. Sub-assembly welding operations in steel framing fixtures, using portable spot welders.
3. Transfer of the cab shell to the body-in-white line for further welding, completing the assembly. These steps include body soldering (which is held to a minimum), initial finishing, etc.
4. Hanging of doors and door fitting.
5. Washing of metal preparatory to painting.
6. Spraying of prime and surface coats in Newcomb-Detroit water-tube type spray booths.
7. Baking in Newcomb-Detroit drying ovens.
8. Sanding the prime coat.
9. Spraying two coats of finish enamel in water-tube spray booth.
10. Drying the finish coats.

The operations starting with the body-in-white metal finishing line all are performed with the cabs loaded on a floor-type, power-driven conveyor 500 ft in length, operated normally at 15 inches per minute. The preceding steps have carried the cabs through the metal finish and through an installation of two spray booths and two drying ovens. Still on the conveyor, the cabs now move into the next department where the structure is sprayed with a noise deadener and where other insulating materials are applied.

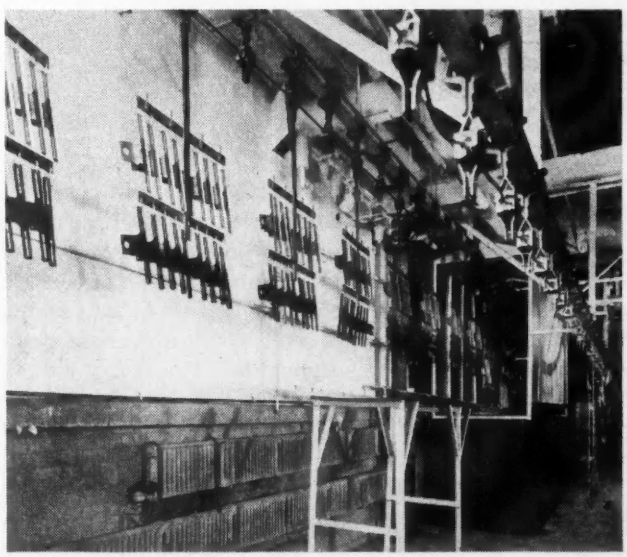
At this point the cabs are trimmed and fitted with seat backs, seat cushions, and upholstery. The component trim and upholstery items are prepared in a small trim shop in this department.

The cabs now are ready for installation on the final assembly line on the main floor that runs directly below the cab line. Transfer from the cab line to the final line is effected by hoist to a conventional body drop through an opening in the floor.

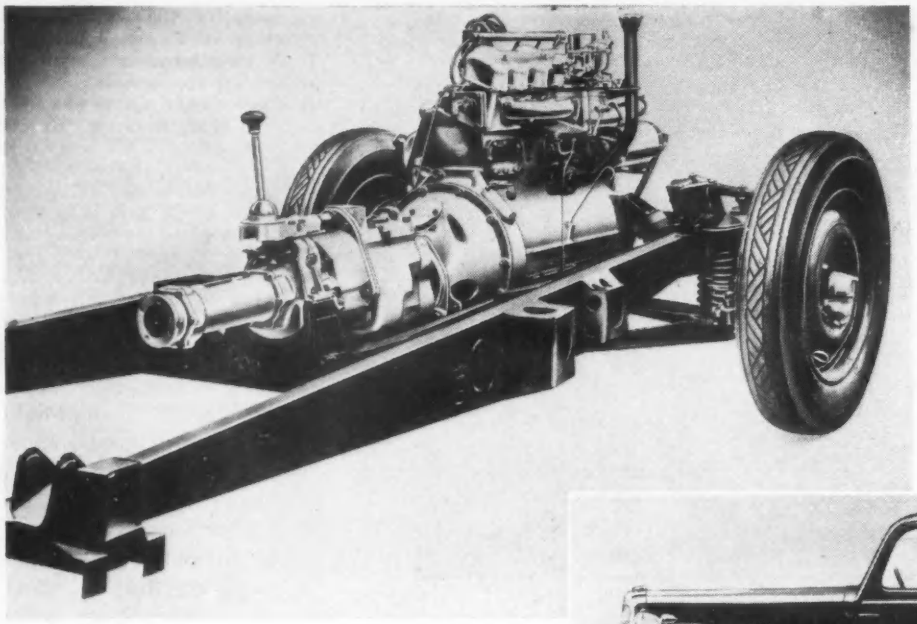
More recently Federal installed an outstandingly compact and modern paint line for finishing the various items of sheet metal such as radiator grilles, fenders, hoods, etc. This operation is completely linked by a monorail some 1300 ft in length which traverses the paint installation, carrying raw parts to paint, then distributing the finished sheet metal to the sub-assembly and assembly stations where the parts are used. This conveyor travels at a speed of about six ft per minute.

Housed compactly on the first floor is the comprehensive paint installation for finishing these sheet metal parts. While on the conveyor the parts first go through a large washing unit for preparing the sheet metal for paint. The parts enter the first prime spray booths of Newcomb-Detroit water-tube type, then go through the drying oven. The monorail next leads into the spray booths for applying the color coats, followed by a pass through the final drying oven.

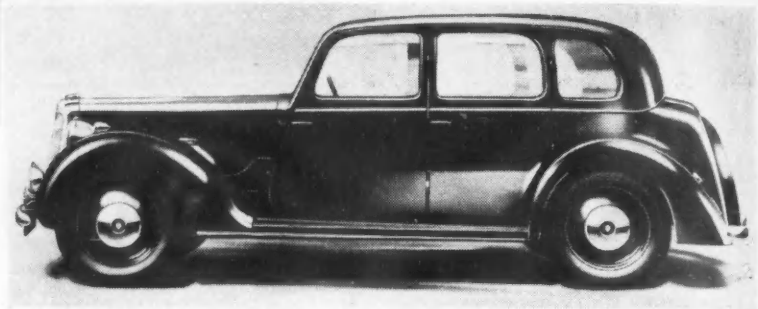
It is of interest to note that the scheduling of assembly lines is handled by a telautograph dispatching system which serves (*Turn to page* 85, *Please*)



This may be the first example of its kind in an automotive plant—the newly installed cable conveyor at Federal Motor Truck Co. It consists of a slender flexible, stranded steel cable suspended from the rail shown near the ceiling. Located in the paint shop, the cable conveyor is a self-contained line carrying miscellaneous sheet metal parts through a black enamel dip at the extreme right.



(Left)—View of the Rover 75 engine and chassis, showing the frame construction and rear of the right front suspension unit with its radius arm to the frame side rail. Also visible is the rubber buffer of the forward engine mount and the rubber-lined cradle supporting the engine at the rear.



(Right)—New British Rover 75 six-cylinder sedan. This model is listed at $3460 for export.

F-Head Engine Powers 1948 Rover Models

By W. F. Bradley
Special European Correspondent
for Automotive Industries

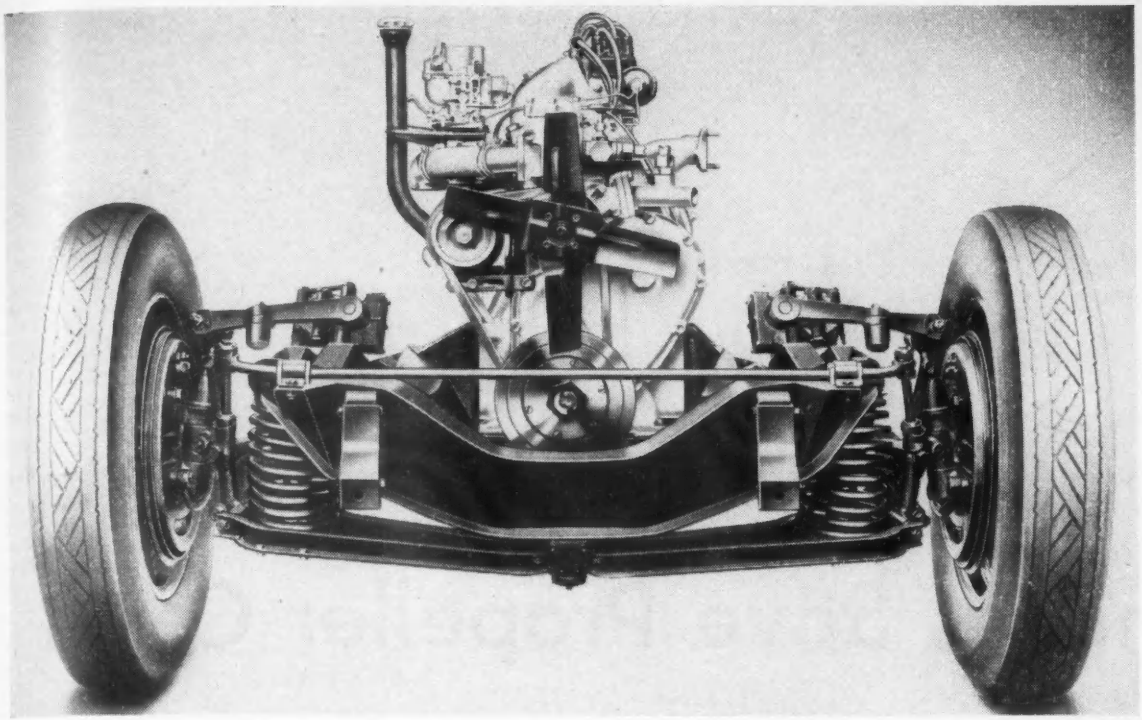
INTERESTING features of the 1948 Rover passenger cars, recently announced by the Rover Co.. Ltd., England, include an entirely new F-head engine with hemispherical combustion chambers, a new design of independent front suspension, and a shortened chassis with box-section side and cross members. Two models are offered, the Rover 60 with a four-cylinder engine, and the Rover 70 with a six-cylinder power plant. Other specifications of the new cars are shown in the accompanying table.

In the design of the new engine, the cylinder head joint is inclined at an angle to the cylinder block with inclined exhaust valves located at the side. The side exhaust valve is thus able to be inclined at a considerable angle to the cylinder center line, which permits ample cooling water flow to be introduced around the exhaust seat. The inlet valve is mounted overhead and operated by a push rod and rocker arms from the camshaft which is driven by a double roller chain provided with a hydraulically-operated automatic tensioner. The exhaust valve is operated by a rocker arm in direct contact with the camshaft. This arrangement makes for a wider engine than normal.

The engine design also embodies a newly developed and patented combustion chamber feature. The spark

SPECIFICATIONS FOR 1948 ROVER PASSENGER CARS

	Model 60	Model 75
Bore (in.)	2.74	2.56
Stroke	4.13	4.13
Displacement (cu in.)	97.4	128.4
Output	60 bhp	75 bhp
Compression Ratio	7.1 to 1	7.25 to 1
No. Main Bearings	3	4
Lubrication	Pressure	
Carburetor	Single—downdraft	Dual—downdraft
Clutch	Single dry plate	
Transmission	Four speeds and reverse with synchromesh 3rd and top.	
Brakes	Hydro-mechanical system	
Suspension	Independent in front, semi-elliptic in rear.	
Wheelbase (in.)	110½	
Tread (in.)	51 3/16 front; 55 rear	
Overall length (in.)	171¼	
Weight (lb)	2950	3070

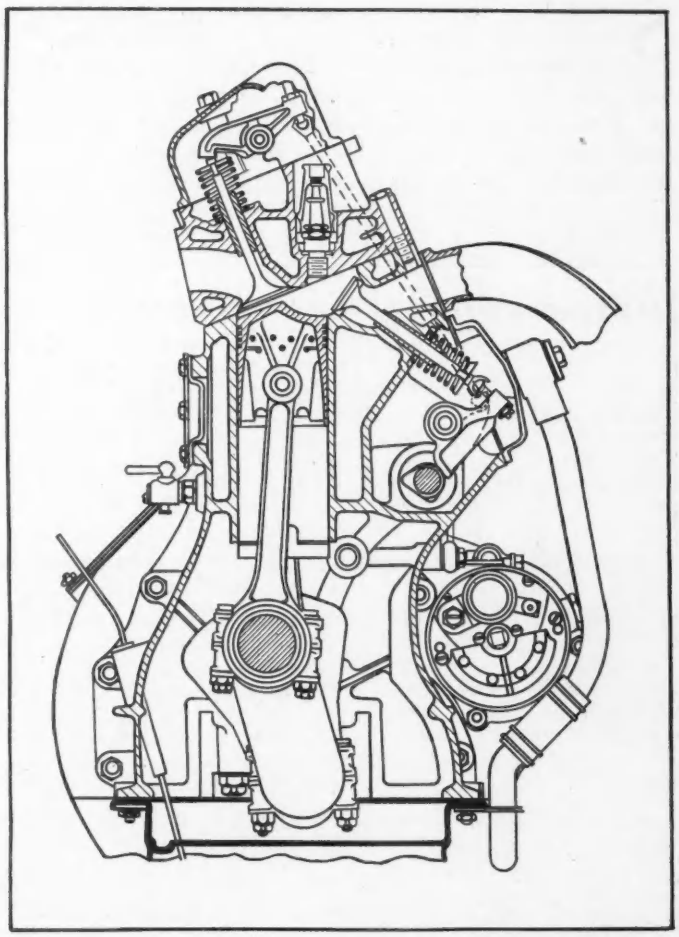


Front view of the Rover independent front suspension with its combination of wishbones, coil springs, double-acting shock absorbers, and torsion anti-roll stabilizer. An advantage claimed for this design is the absence of any tendency for the front of the car to dip when the brakes are applied.

plug is located in the center of the flat side of the hemispherical combustion space, which allows for a very short flame travel, permitting the use of a high compression ratio of 7.1 to 1 for the four-cylinder engine and 7.25 to 1 for the six, using 72 octane number fuel. The four-cylinder power plant, with a bore and stroke of 2.74 by 4.13 in., develops 60 bhp; and the six, with a bore and stroke of 2.56 by 4.13 in., develops 75 bhp. The pistons of both engines are inverted V shaped in the head to conform to the hemispherical combustion chamber. It is claimed that this special construction of the piston and combustion chamber gives increased turbulence and mixing of the fuel charge, thus enabling use of a weaker mixture and effecting a savings in fuel. The bmep of this new power plant is given as 126 psi, as compared with 104 psi for the former engine.

Chassis features are independent suspension in front by means of coil springs and wishbones which are pivoted to the under face of the heavy box-section forward cross frame member. In addition, radius arms are used, the inner extremity of each arm being anchored by ball and socket to diagonal members of the main frame. At the point of attachment of the rubber-bushed radius arms, the diagonal frame members are stiffened to the box-section side rails. An Armstrong double-acting shock absorber is built in with the suspension, being mounted on the top of the frame member.

A feature of the frame construction is that it is cut short at the (*Turn to page* 85, *please*)



Cross-sectional drawing of the new Rover L-head engine shows arrangement of the valves and combustion chamber. **(Courtesy *The Autocar*)**

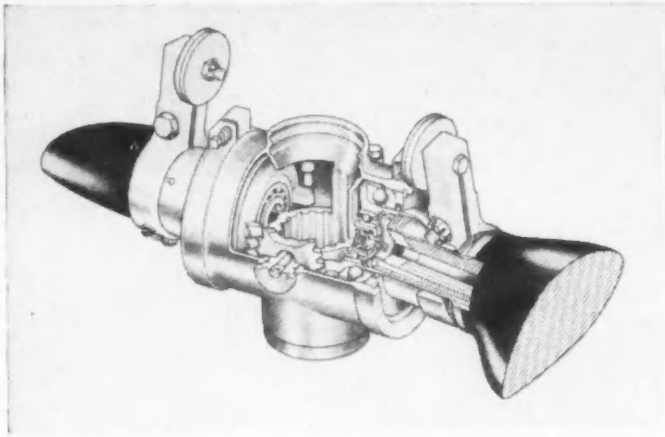


Fig. 1—Cutaway view of the Model 220 Aeromatic propeller for 165 to 250 hp

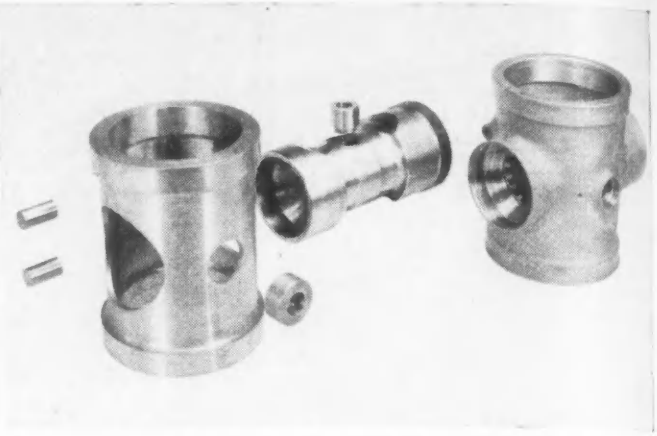


Fig. 2—Components of the arc-welded Model 220 propeller hub are shown here with the finished product

Furnaces Save Propeller Costs

By John D. Waugh,
Aeromatic Propeller Department
Koppers Co., Inc.

SINCE the Aeromatic variable-pitch propeller first became an accepted personal plane component in 1940, its successful introduction and adoption has been dependent on the extensive use of economical mass production techniques. Foremost among these has been the use of a variety of gas and electric furnaces to speed specific manufacturing processes, apply entirely new ones, and assure positive control of conventional operations. The success of one manufacturing process, that of arc welding the entire propeller hub structure, is dependent in a large measure on the close control of hub metal heat treatment through the use of proper furnaces.

The variable-pitch operation of the Aeromatic results from its geometrical configuration and mechanical appointments. The hub, of either flange or shaft retention design, retains plastic covered, laminated wood blades in bearing mounted retainer flanges. The flange incorporates a construction, or lag, angle which inclines the blade rearward in the plane of rotation. This rearward lag angle provides a moment arm for aerodynamic thrust to turn the blade toward low pitch at take-off when thrust is high. Counterweights, on arms attached to each blade shank, have a centrifugal flyweight action which increases blade pitch as airplane speed increases and thrust decreases. The mathematical basis for this automatic principle is so developed that when the formula is satisfied by precision manufacture, a constant engine speed is maintained from take-off through climb and high speed. The simplicity of mechanical

TABLE I—COMPARISON OF FORGED AND WELDED MODEL 220 PROPELLER HUBS

	Raw Material Weight (lb)	Raw Material Cost	Standard Machine Time (man hours)	Direct Labor Cost	Total Cost (including burden)	Finished Hub Weight (lb)
Forged Hub	64.7	$10.36	16.4	$20.50	$61.61	17.8
Welded Hub	47.1	6.80	9.1	11.38	35.25	12.2
Gross Savings	17.6	3.56	7.3	9.12	26.36	5.6
Per Cent Savings ..	27.2%	34.4%	44.5%	44.5%	42.8%	31.5%

TABLE II—COMPARISON OF SOLID AND COPPER-BRAZED BLADE FERRULES

	Raw Material Weight (lb)	Raw Material Cost	Standard Machine Time (man hours)	Direct Labor Cost	Total Cost (including burden)
Solid Ferrule	7.63	$0.61	1.05	$1.37	$4.04
Brazed Ferrule	3.9	0.34	0.83	1.08	3.04
Gross Savings	3.73	0.27	0.22	0.29	1.00
Per Cent Savings ...	48.8%	44.2%	20.9%	20.9%	24.7%

TABLE III—COMPARISON OF TWO-PIECE AND ONE-PIECE PLASTIC BLADE COVERINGS

	Man Hours Required	Direct Labor Costs	Material Costs	Total Cost (including burden)
Two Piece Plastic	0.78	$1.01	$1.30	$3.82
One Piece Plastic	0.43	.56	1.30	2.70
Gross Saving	0.35	.45	0	1.12
Per Cent Saving	44.8%	44.8%	0	29.3%

Fig. 5—The propeller ferrule is pictured here in three stages of manufacture. From left to right: components of the tubular ferrule, the welded furnaced-brazed ferrule before machining, and the finished product

structure resulting from the use of the "autodynamic" principle is shown in the cutaway view in Fig. 1. In the absence of auxiliary pitch changing mechanisms, such as motors or hydraulic devices, familiar to the high horsepower class of variable-pitch propeller, the major constituents of the propeller are the hub, blade retaining flanges, blade ferrules, and blades. The bearings, seals, and blade synchronizing parts are all standard or so simple as to present no production problems and little variety as to method of manufacture.

Welding

Major components of the Aeromatic propeller have been the subject of exhaustive examination to determine the best and most economical method of fabrication. Competing with the low-cost fixed-pitch propeller, except in the 100-hp upward range where variable-pitch operation is mandatory, the Aeromatic had to be produced inexpensively even before it could be introduced to the postwar market. The first important achievement in a production process was the use of arc-welded tubular construction in the hub to replace the more expensive technique of machining from solid forgings. (See AUTOMOTIVE INDUSTRIES, Nov. 15, 1947).

The hub barrel and cross tube, shown in Fig. 2, are machined from electric furnace aircraft quality SAE 4130 seamless steel tubing purchased in a finish annealed condition. Both hot finished and cold drawn tubes are welded with equal satisfaction. The bearing bosses, synchronizer boss, and smaller parts are of normalized SAE 1020 analysis steel.

Prior to arc welding the hub barrel and cross tube, the two pieces are placed in a jig and tack welded together. This unit is then preheated in the small gas furnace, shown in Fig. 3, to a tempera-

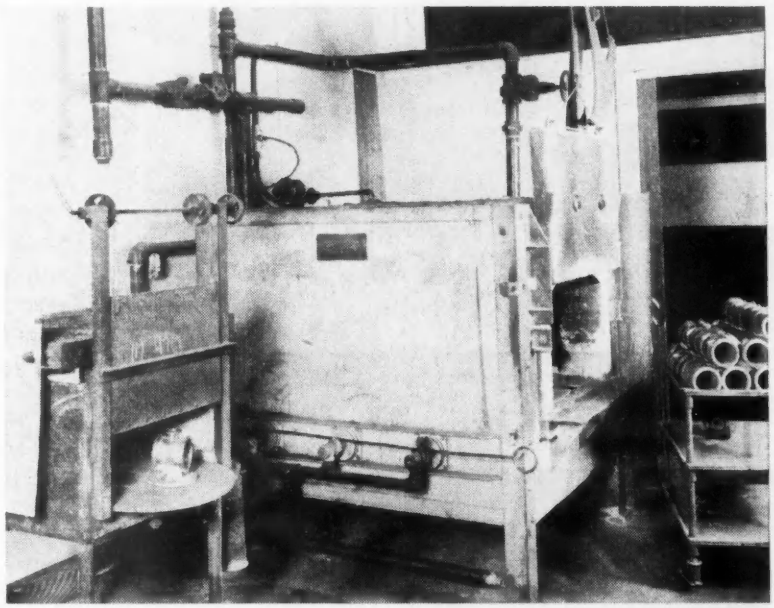


Fig. 3—Small welding pre-heat gas furnace and 1500-deg normalizing Surface Combustion gas furnace. A flange-design hub is shown in the pre-heat furnace

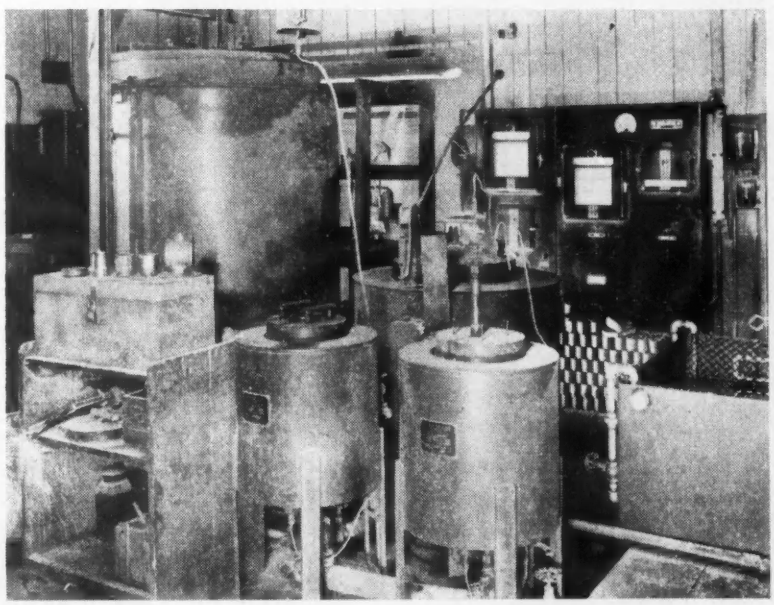


Fig. 4—Leeds and Northrop Vapocarb cracking furnaces, Vapocarb and big Homo heat-treating furnaces with Micromax control panel. Large Hump furnace is to the right of the group

Fig. 6—Sliding a load of ferrule bodies into a 30-kw Westinghouse controlled-atmosphere brazing furnace

Fig. 7 (Above)—Finished carved blades complete with ferrules in Gehnrich 30-kw electric furnace ready for 45-min heating cycle

Fig. 8 (Right)—Application to heated blade of single sheet of cellulose nitrate

ture of 550F. In this condition weld porosity is eliminated and the liklihood of weld strains is minimized. Following preheating, the cross tube is welded externally and internally with 5/32 in. Planeweld electrodes making fillet welds. Immediately following the barrel-cross tube weld, the hub is normalized for ¼ hr at 1500F in the Surface Combustion gas furnace, also shown in Fig. 3, and the hub is allowed to cool in still air. This furnace treatment relieves the welds and normalizes the hub before intermediate machining is performed.

Machining at this stage, before all of the hub parts are welded in place, has been found necessary to eliminate any distortion that may have taken place and to provide location for additional parts and final machining. After the barrel and cross tube have been machined to an accurate relationship, the synchronizer boss, bearing bosses, pitch bolt bosses, and oil plug are tack welded in place. Preheating to 550F is done again, and the entire unit is welded together in a jig. Following the final welding, the hub is again normalized in the Surface Combustion furnace for ½ hr at 1500F and allowed to cool in still air.

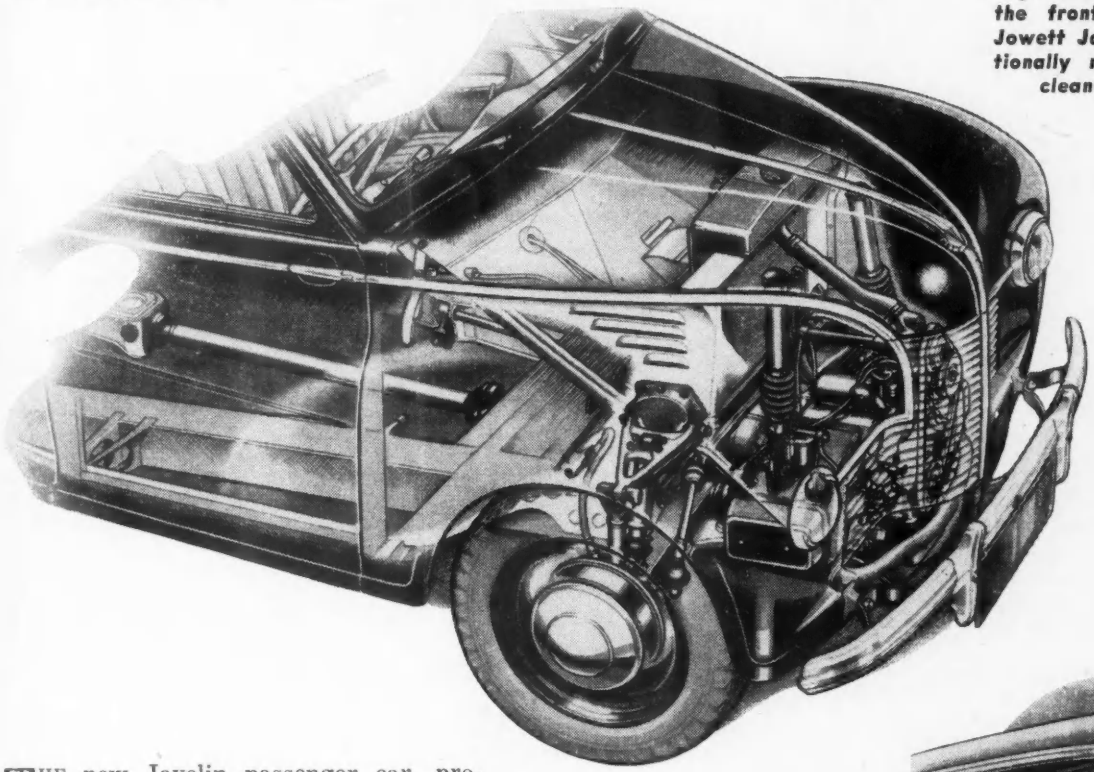
Heat Treating

After weld inspection the hubs are normalized in a Leeds and Northrop 30-kw 220-v Vapocarb Hump furnace for eight hr at 1550F. Oil fed into a Vapocarb cracking furnace is vaporized and forms a protective atmosphere which produces uniform work without scale and decarburization. Following the heating cycle, which is automatically controlled and recorded by Micromax instruments, the hubs are quenched in oil and withdrawn after they have cooled to below the flash point of the oil. Before they become cold the hubs are transferred to a Leeds and Northrop 48-kw 220-v Homo furnace, shown in Fig. 4, where they are drawn for four hr at 1050F to obtain a Rockwell C hardness of 24-29. They are allowed to cool in still air. The big Homo tempering furnace

(*Turn to page 80, please*)

Javelin Design Features

Two executives of the Jowett company are now in this country studying the latest automobile production equipment and methods, and examining the possibilities of marketing the Javelin car, which is described in this article. They report that the Javelin design has created considerable interest in American technical circles and that several automobile companies have ordered Javelin cars.

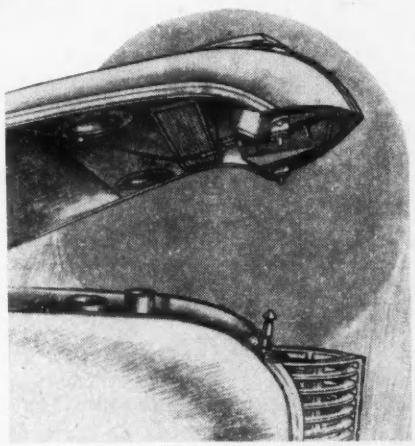


(Below) Through the use of a compact flat four-cylinder engine, mounted forward of the front wheels, the new Jowett Javelin has an exceptionally roomy interior. Air cleaner is not shown.

THE new Javelin passenger car, produced by Jowett Cars, Ltd., Great Britain, features a flat four-cylinder engine with overhead valves and hydraulic tappets, torsion-bar suspension both front and rear, and an all-steel integral body and sub-frame construction. As shown in the drawing, the engine is carried slightly forward of the front wheels, with the radiator located to the rear. Cylinder dimensions are 2.85 by 3.54 in. bore and stroke, giving a displacement of 90.7 cu in. This four-cylinder powerplant is equipped with two carburetors, one for each pair of cylinders, and develops a maximum of 50 bhp at 4100 rpm. The combined cylinder block and crankcase is an aluminum die casting in two halves which are joined vertically at the main bearing housings. Wet cylinder liners are used; and the forged steel crankshaft has four throws with three main bearings. The hydraulic self-adjusting tappets are operated by means of long, inclined push rods from a camshaft immediately above the crankshaft.

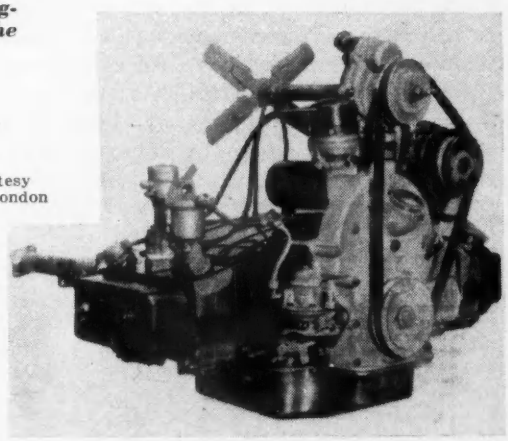
The suspension is independent in front with torsion bars and wish bones, and in the rear consists of torsion bars with radius arms. Hydraulic dampers are used both front and rear. The underframe consists of two box-section girders welded at the rear to a sheet steel assembly, and at the

(*Turn to page 64, please*)

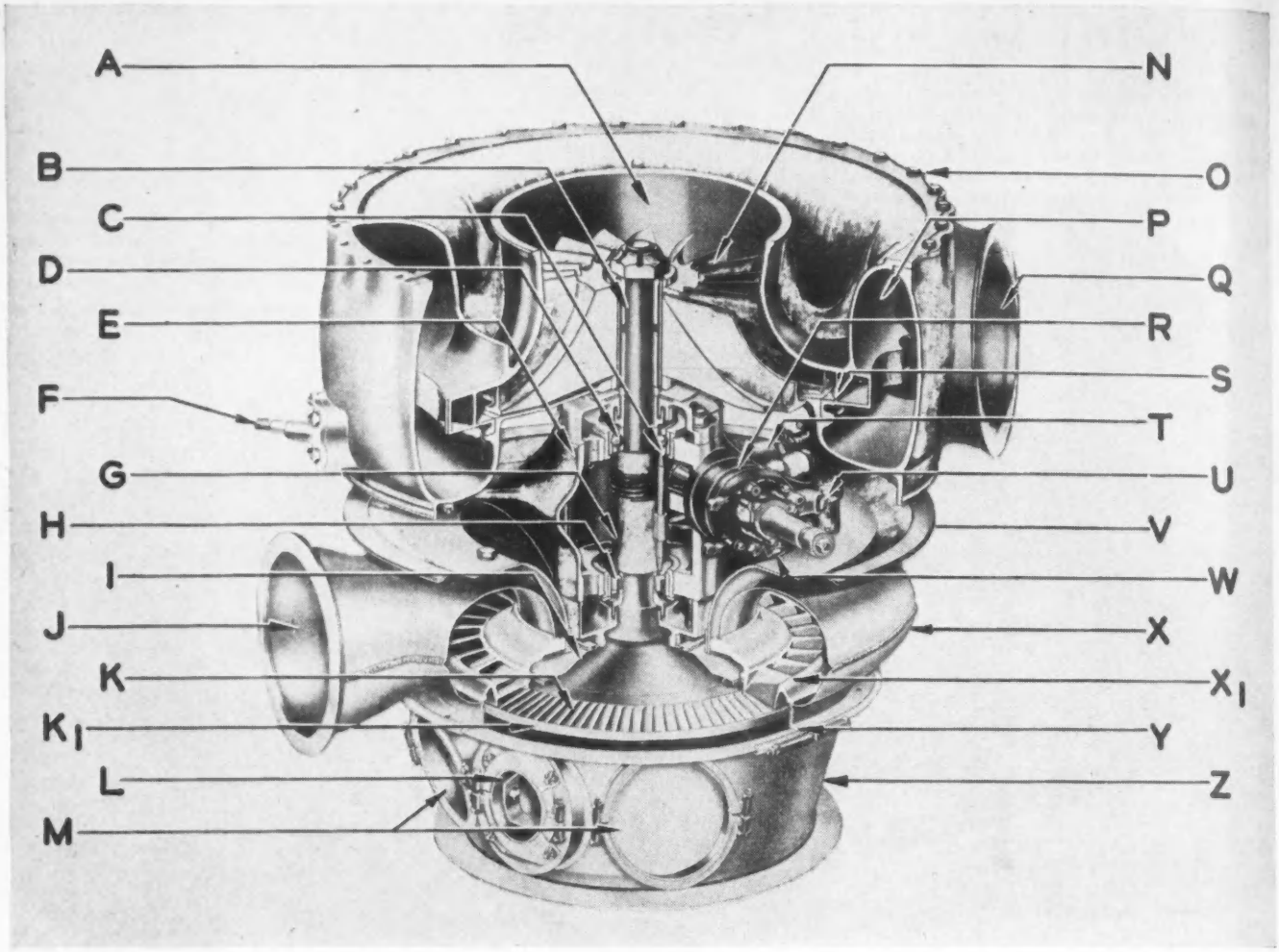


(Right) An unusual feature in this new British passenger car is the location of the air silencer and cleaner. It is mounted in the underside of the hood, and rises clear of the engine (as shown) when the hood is raised. When the hood is closed, vertical intake pipes from the two carburetors register with ports in the air cleaner

Drawing by courtesy of *The Autocar*, London



The 50 hp flat four-cylinder engine



First Turbosupercharger Application on Airliner

FIRST commercial application of the war-time developed General Electric turbosupercharger is found in the power plant installation of the Model 377 Stratocruiser, Boeing Aircraft Company's 340-mph luxury airliner. Each power package of the Stratocruiser includes one BH4 exhaust-driven turbosupercharger having a single-stage centrifugal compressor and a single-stage axial-flow turbine, which will permit the engine to develop METO power at any altitude up to approximately 24,000 ft. Major difference between the BH4 and its military predecessor is that the BH4 has a slightly lower capacity than the highpower turbosupercharger used with the R-4360 engine on military aircraft. The Stratocruiser was designed for long range flight and high economy cruising operation. Components of the BH4 are shown and identified in the accompanying cutaway drawing.

A—Compressor air inlet
B—Rotor shaft
C—Oil jet
D—Ball bearing
E—Bearing-and-pump casing
F—Turbo mounting-trunion
G—Pump-drive sleeve
H—Roller bearing
I—Sealing-plate assembly
J—Exhaust-gas inlet
K—Buckets
K_1—Bucket Wheel
L—Cooling-cap blast tube exit
M—Inspection ports
N—Impeller
O—Compressor casing
P—Diffuser
Q—Compressor-discharge outlet
R—Oil pump
S—Diffuser vane
T—Oil pressure - and - scavenge lines
U—Plugged oil-filter line connection
V—Baffle ring
W—Screw (oil by-pass)
X—Nozzlebox
X_1—Nozzlebox diaphragm
Y—Nozzlebox L-ring
Z—Exhaust shroud

AIRBRIEFS

By ROBERT McLARREN

HELICOPTER MATURITY

Fourth Annual Forum of the American Helicopter Society made it evident to delegates that the rotary wing aircraft has reached a maturity virtually equal to that of the fixed wing aircraft itself on the basis of dependability, flexibility and operating economy. The Air Force, Naval Aviation and the Coast Guard revealed that the helicopter is now an integral part of their respective operations. Air Force wants a multi-engine, long-range design capable of accompanying combat missions to provide instant rescue of complete bomber crews. The Navy will replace its float-equipped scout and observation planes aboard cruisers and battleships with helicopters and has already placed these craft aboard all carriers as standard equipment. Coast guard has assigned helicopters to its Great Lakes ice-breakers, which were able to free ships from Buffalo 67 days earlier than last year through the use of helicopters scouting ahead of the ice-breakers. Commercially, the helicopter proved 98 per cent effective against the locust plague in Argentina, saving crops valued at $8,000,000. It has saved one whole day in air mail service between Los Angeles and the East through the use of helicopter mail pick between airport and local post office stations. It now operates at a direct cost of about $4.00 per hour. Only one major obstacle remains to clear the way for public acceptance: its high initial cost, which is about $70,000 for the Sikorsky and something less for the Bell. Helicopter operators believe that when a $10,000 four-place model becomes available the helicopter day will have arrived.

CONTRACTING UNDER WAY

Without waiting for formal enactment of aircraft procurement legislation and appropriations, the Air Force has already begun implementing its 70-Group program. Contracts let include $19,000,000 to Douglas Aircraft Co. for the construction of an improved model of the DC-7 Globemaster transport. Improvements include strengthened wings, increased power, redesigned cockpit and greater load and speed. The modifications will also be made on the 14 Globemasters the Air Force already has in service under the terms of the contract. The giant, four-engine, 65-ton craft will become "strategic cargo" planes to complement the "strategic bomber" echelons of the Air Force. Bell Aircraft has received a $2,000,000 order for its R-13B helicopter. Curtiss-Wright has received a $1,500,000 contract for the design and construction of production tooling for its XP-87 "All-Weather" fighter as a preliminary to a formal production contract for the airplane.

VARIABLE JET NOZZLE DEBATABLE

Republic Aviation Corp. engineers report that extensive test flights failed to reveal any substantial advantage to the use of a controllable "plug" in the nozzle of the P-84 Thunderjet fighter plane. Although this method of varying the nozzle area to accommodate different thrusts and temperatures of the turbo-jet engine at altitude has been energetically suggested, Republic engineers state that the effectiveness of the plug in the P-84 was apparently within the experimental error of atmospheric temperature, measuring instruments and piloting technique and certainly not the 20 per cent gain long claimed for the device. Research engineers also report evidence that the variable area nozzle is not of comparable benefit to that of thrust augmentation through water injection or tail pipe afterburning.

PROCUREMENT IN FOCUS

With the 70-Group program of the Air Force finally organized for procurement, its impact on the wobbly aircraft manufacture industry is becoming apparent. The program is organized as follows: 22 Heavy and Medium Bomb Groups (630 aircraft) including six Medium Group and a flying tanker squadron, 22 Day Fighter Groups (1650), six Medium Cargo Groups (288, four Heavy Cargo Groups (144), four Tactical Reconnaissance Groups (216), four Light Bomber Groups (192), two Very Long Range Weather Groups (72), two Very Long Range Photo Groups (72), three All Weather Fighter Groups (108) and one Very Long Range Mapping Group (36).

All of the aircraft to be procured under this program will come from those already in production or those that have already passed prototype flight tests. Thus, none of the new jet fighters or bombers will be featured in the program other than those already publicized. In addition to the familiar Republic P-84, North American P-86, Boeing B-50, North American B-45, Convair B-36 and North American P-82, production contracts loom a certainty for the Curtiss XP-87, Boeing XB-47 and the Republic XF-12. Still a question mark is the Northrop Flying Wing bomber of admittedly superior performance but for which no firm commitments have yet been revealed. Vastly increased aircraft engine production will be required for the program, particularly the Pratt & Whitney R-4360 and the Allison-GE TG-180 and TG-190 turbo-jet engines, the latter a more powerful version of the familiar axial-flow design. Propellers, accessories and Government furnished combat equipment will be needed in substantial quantities.

PLANT DISPERSAL AGAIN

The move of Chance Vought Division, United Aircraft Corp. from Bridgeport, Conn. to Dallas, Tex., is first major success of the Government's urgent program of plant dispersal to the interior. When first suggested the idea met deaf ears in the industry and Government pressure relaxed. Boeing Aircraft retained its Wichita, Kans. facility, which is now accelerated to capacity on a B-29 modification program for the outfitting of flying tankers for mid-air refueling. Now in the discussion stage are a Grumman move to Arizona, a Republic move to Indiana and Douglas resumption of its Oklahoma plants. Both Army and Navy have recalled their major war surplus aircraft plants back for direct administrative control, although immediate change of occupants is not contemplated. Industry objections to the moves, even at Government expense, center around employe families, labor shortages in the event of emergency and disruption of extensive sub-contractor "complexes" now surrounding major airframe plants.

THIRD CREWMAN ORDERED

Losing a vigorous battle, the airlines have been ordered to place a flight engineer abroad all Douglas DC-6, Boeing Stratocruisers and Douglas DC-4 transports, the latter when "required for safety". This move will cost either the industry (Boeing, in particular) or the airlines millions of dollars in modifications to existing transports to make such an installation due to the relocation of power plant controls and instruments in a new cockpit arrangement. The flight engineer will be in complete charge of the aircraft power plant during takeoff, flight and landing. The Martin 2-0-2 and the Convair Liner may later come under the requirement for "aircraft over 30,000 lbs." when the Administrator finds the type requiring the third crew member. Purpose of the move is to improve safety through relieving the pilot and co-pilot of power plant responsibility.

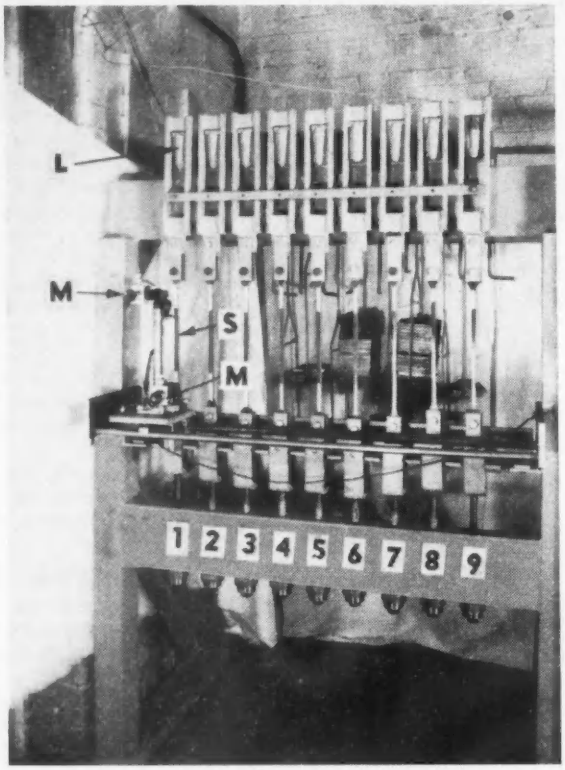


Fig. 1—Nine-unit static tension creep testing machine

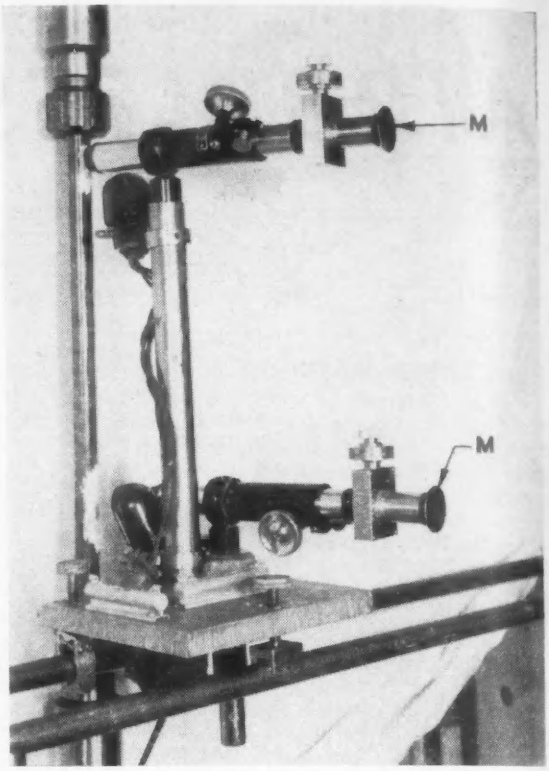


Fig. 2—Creep deformation of specimen subjected to static tension is measured by micrometer microscopes, as shown here

New Creep Testing Machines

By Joseph Marin
Professor of Engineering Mechanics, Pennsylvania State College

STRESSED metals at high temperature, as found in steam and gas turbines, some automotive parts and oil refining equipment, creep or plastically deform with time. Plastics, lead and some nonferrous metals creep at room temperatures. For various types of materials it is, therefore, necessary for the designer to select design stresses based upon a permissible creep deformation during the expected life of the part designed. For this purpose, it is necessary to obtain creep test data at various stresses for the particular operating temperature considered. In the past, most creep tests have been made on specimens subjected to simple static tensile stresses. Recently, several static tension, static torsion, static bending, fluctuating tension and fluctuating torsion-tension creep testing machines were developed at The Pennsylvania State College by the author. These machines, which are described below, were used for a project sponsored by the National Advisory Committee for Aeronautics.

Static Creep Machines

Fig. 1 shows a nine-unit static tension creep machine. A specimen S is subjected to a tensile load by means of dead weights applied at the end of the lever L. At selected time intervals the creep deformation is measured for a given gage length of the specimen by measuring the change in distance between points on the specimen with the aid of micrometer microscopes, M as shown in Fig. 2. With the data obtained, unit creep strain values can be plotted versus time for each specimen and stress. Most creep tests are made for periods of time of 1000 hr as specified by the Standards of the American Society of Testing Materials.

An eight-unit static creep bending machine is pictured in Fig. 3, while one of the units is shown in Fig. 4. A weight applied at W subjects the specimen S to pure bending free from transverse shear stresses. By having eight units, specimens subjected to different stresses can be tested simultaneously. A specially constructed gage with a dial is used to measure the creep deflection at various intervals of time. With the observed data, creep deflection-time graphs can be plotted for various bending stresses.

A single torsion creep unit, part of a four-unit machine, is shown in Fig. 5. (*Turn to Page 78, please*)

Fig. 3—Eight-unit static creep bending machine

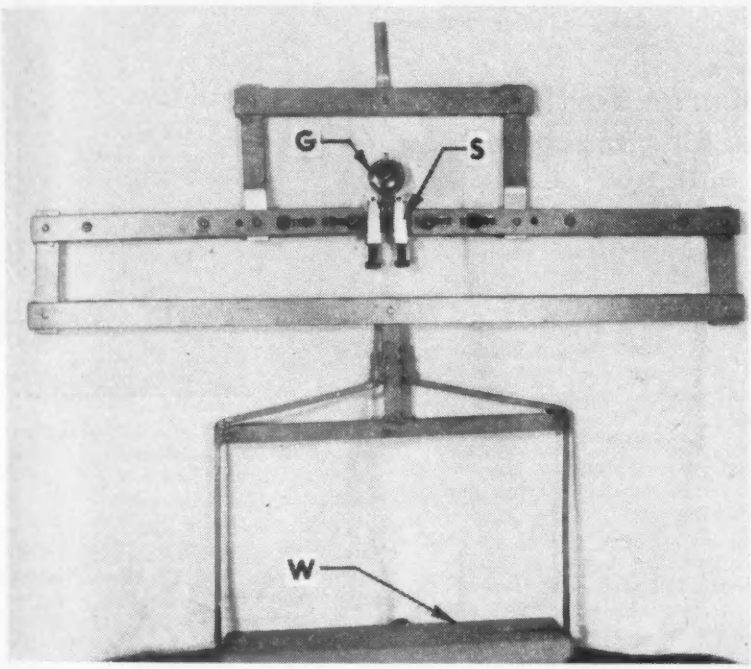


Fig. 4—This photo of a static creep bending unit shows how the weight W subjects the specimen S to a pure bending, free from transverse shear stresses

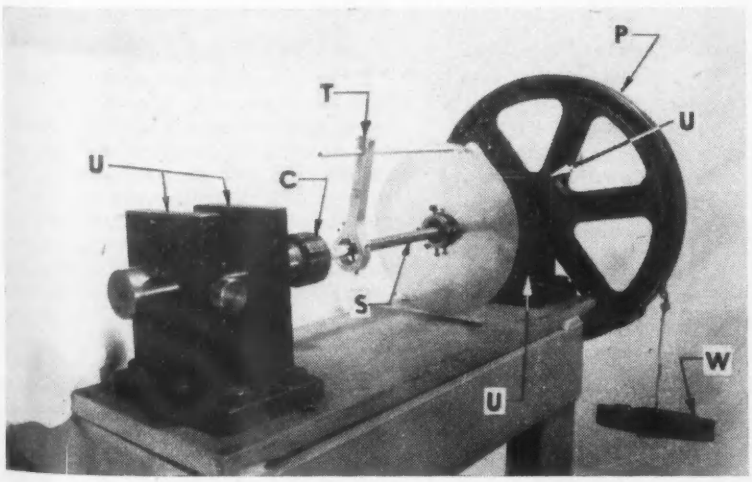


Fig. 5—(left) Static torsion creep testing unit

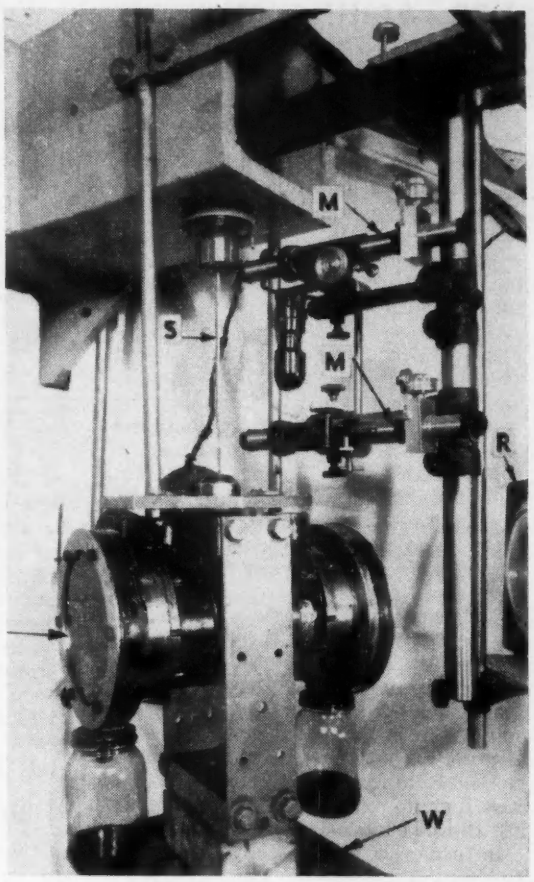


Fig. 6—Dynamic tension creep machine

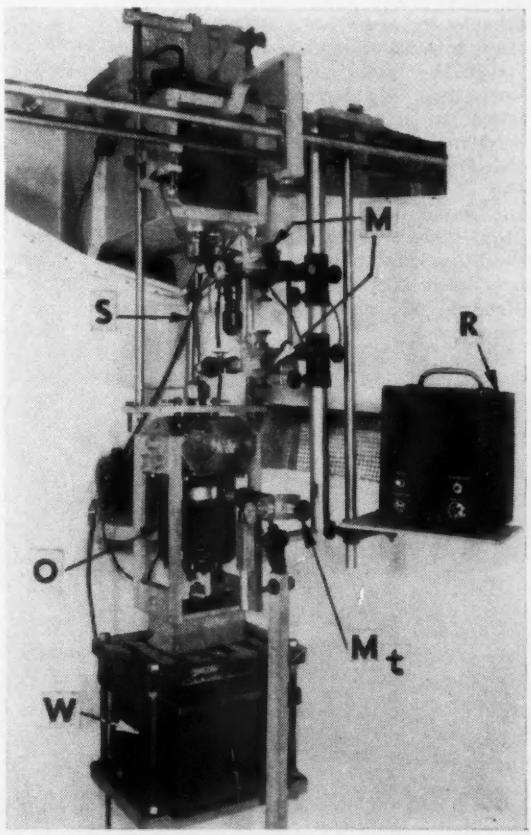


Fig. 7—(Above) Dynamic torsion-static tension creep testing machine

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56.

J-88—Multiple Wheel Hydraulic Grinder

The Landis Tool Co., Waynesboro, Pa., announces a new multiple wheel plain hydraulic grinder. This production grinder is designated as a 10 in. by 30 in. Type CH-IW.

Grinding machines of this type carry a multiplicity of wheels on a spindle between the bearing supports. With this arrangement, simultaneous grinding of many diameters on the same shaft may be accomplished. The diameters being ground do not have to be straight. Provision has been made to profile dress the wheels, so that tapers and other odd shapes may be finish ground.

Maximum work swing is 10 in. and the maximum outside dimension across the grinding wheels is 30 in. The standard grinding wheel diameter is 36 in., worn wheel size is 26 in. in diameter.

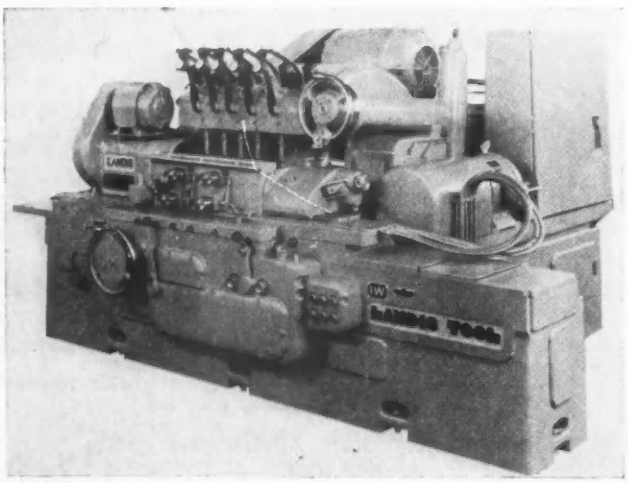
To remove the wheels when worn, the fender and wheel feed arm, both pivoted at the rear, are swung up out of normal position. By releasing hinged clamping blocks, the entire spindle and spindle bearing assembly may be lifted out of the machine. Retaining rings and wheels may then be removed without disturbing the bearing assembly.

In order to dress the wheels to different diameters or shapes, a diamond bar is made to follow profile bars mounted on the front of the bed. A rapid traverse is provided between wheels in order to reduce dressing time to a minimum.

Wheel feeds are hydraulically operated. Rapid feed advances the wheel to grinding position, and slow feed moves the wheelbase slowly for grinding. A built-in device prevents the slow feed from starting until the rapid feed is against its front stop. The amount and rate of slow feed is adjustable. Hydraulic cushions are used for the front and return strokes of the rapid feed on the wheelbase.

Rates of hydraulic slow feed and hydraulic carriage traverse are controlled by throttle valves at the front of the machine. Built in locks on these valves may be provided so that the feed and traverse rates can be set for best results, and then will not be disturbed.

Hydraulically operated backrests are mounted on the swivel table. These units automatically move into position at the end of the rapid feed stroke. They have Carboloy tipped shoes and are fully adjustable for different diameters.



Landis multiple wheel plain hydraulic grinder

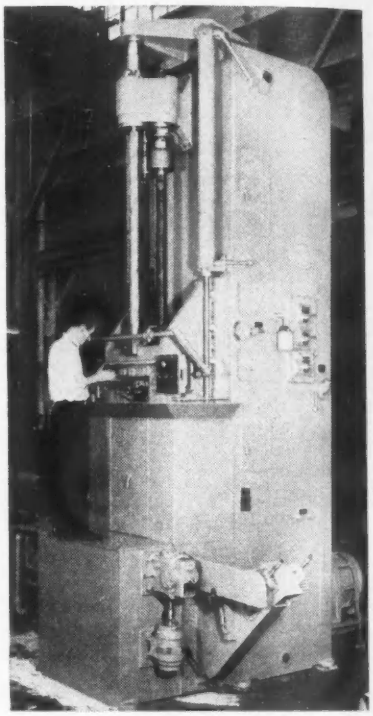
J-89—Large Vertical Broaching Machine

The American Broach & Machine Co. of Ann Arbor, Mich., has completed a large type vertical pull-up internal hydraulic broaching machine. This machine with an overall height of 16 ft, 10 in. and a gross weight of over 17 tons, has a normal operating capacity of 30 tons and a broaching stroke of 60 in. The machine is designed to broach involute splines in gear blanks.

Several outstanding features are incorporated, one of which is the helix lead and nut bar for driving the broaches during the pulling stroke. Another is the lower guide which not only raises the broaches up to the pull heads, but also continues up, providing the large broaches with additional alignment during the broaching stroke.

Operation of the machine is controlled by push buttons and all operating cycles are electrically interlocked as a safety measure for the operator and machine mechanism.

One complete cycle produces two parts which are first loaded into a slide while the broaches rest in the lower guide. The slide is pushed into position and buttons depressed to start the machine cycle. Broaches are raised by a lower guide until the shank ends come up through the parts, and are connected in the automatic broach pull heads. The main machine ram then starts the broaching stroke and the lower guide continues up, providing alignment for the principal portion of the cutting action. When broaches reach the top portion of the cycle, operator unloads parts and then starts main slide down, returning broaches to the lower guide.



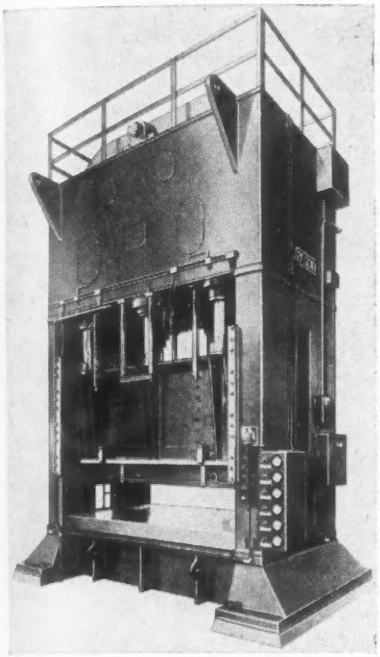
Vertical pull-up internal broaching machine made by American Broach & Machine Co.

J-90—New Type Drawing Presses

Two principles of force application — mechanical and hydraulic — have been combined for the double action deep drawing of ferrous and non-ferrous metals in the Type MH Verson double action presses made by the Verson Allsteel Press Co., Chicago 19, Ill. This line is said to have the high productive capacity of the mechanical drawing press, plus the adjustable blankholder features previously found only in hydraulic presses.

Among the advantages claimed for this combination mechanical-hydraulic press are: Increased production on deep draw; instantaneous adjust-

ment of pressure by valves and direct reading gages at any pressure point on the blankholder; blankholder is self-adjusting for any thickness of stock and automatically compensates for minor variation in stock thickness during normal operation; all need for the use of shims to obtain correct and uniform blankholding pressure is eliminated, no tool-damaging impact between blankholder stock and die.



Type HM press made by Verson All-steel Press Co.

These presses can be converted quickly from double action press work to single action press work. Press cycle, including the delayed action return of the bed cushions, is fully automatic and controlled by means of electric push button and selector panel.

This type of press is available in a wide range of bed sizes and tonnage capacities.

J-91—Two New Heald Machines

Designed by the Heald Machine Co., Worcester 6, Mass., especially for work up to four in. OD which can be rotated on its outside diameter, the new Heald Model 181 is a fully automatic centerless type internal grinder. This principle of workholding and rotation is said to produce uniform wall thickness, perfect concentricity between ID and OD, and permit reloading for multiple operations without error. These machines are fully automatic in every element of the grinding cycle, including loading and unloading.

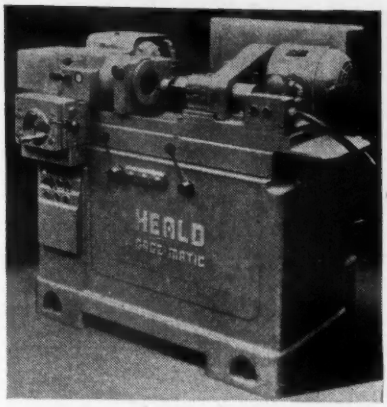
The amount of in-feed diminishes from roughing through finishing feed according to a pre-set rate, producing spark-out effect as size is approached.

A new automatic loading and unloading device operates extremely rapidly; table and independent cross slide feeds once set at highest rate consistent with desired results remain constant regardless of oil temperature changes.

These new machines are furnished with either Size-Matic or Gage-Matic sizing. Gage-Matic models may also be operated Size-Matically.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56



Heald Model 171 chuck-type internal grinder

In the small work field, up to two in. ID, Heald has added one more internal chuck-type grinder, the Model 171. Specifically designed for small work and large lot production, this model like other new Heald grinders is available with both Size-Matic and Gage-Matic features of automatic sizing. Machines may also be furnished with the Size-Matic method alone.

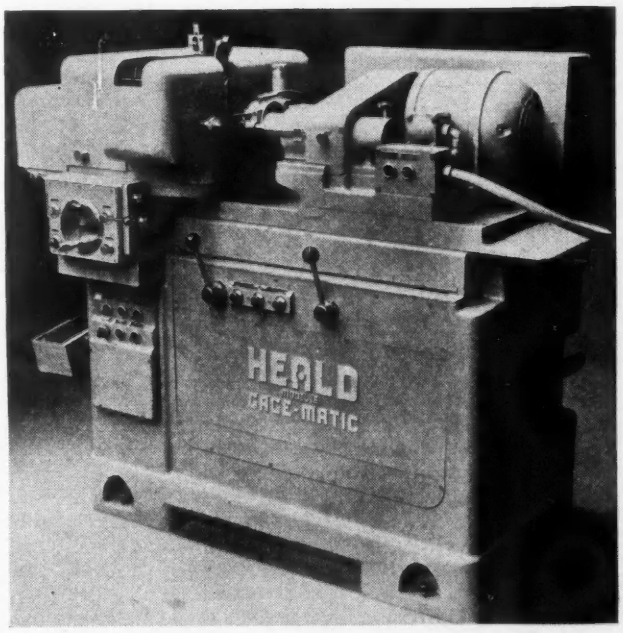
The amount of in-feed diminishes from roughing through finishing feed according to a pre-set rate, producing extremely fine finishes with simple control settings.

Operating levers, including chuck release control, are arranged for quick operation. A single control knob sets roughing and finishing cross feed cycle; table speeds are controlled by individual, finger-tip action knobs; and table stroke is set by self-locking reverse dogs. The workhead may be accurately set for straight or taper grinding.

J-92—High Speed Welding Press

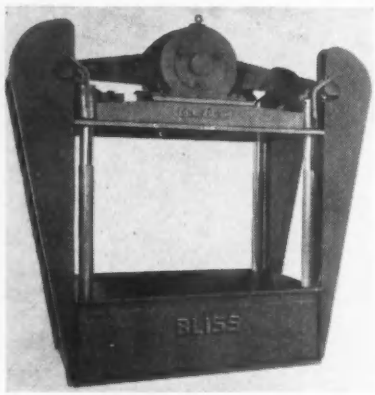
High speed assembly of large metal section is possible on a welding press recently developed by the E. W. Bliss Co., Detroit, Mich. Complicated assemblies which formerly required many separate operations are performed automatically in one step. At present, these presses are being used by a large automotive manufacturer for assembling chassis, dashboards, body panels and similar units.

In operation, the units to be assembled are placed in position on the lower die or pre-loaded on conveyors, after which the press cycle



Heald centerless internal grinder Model 181

is completed automatically. The lower die is raised until it contacts the upper die, which contains welding tips placed in positions corresponding to the spots to be welded on the metal section. Limit switches stop the slide in the correct position, perform the welds, and return the slide to the lowered position when all the welds are completed. The spot welding is done electrically and any



Bliss welding press

number of welds can be made at once.

The new welding press is available in two models, which are essentially the same except for the position of the driving mechanism. For use in shops with limited headroom, the 4LU series is designed with the driving unit in the base. Where headroom is no object, the 4L series has the driving mechanism in a more accessible position on top of the press. The 4L series also permits a change of stroke from 12 in. to 16 in. without change of parts. In both series, the lower die moves up to contact the stationary upper die, and is supported at four points to assure accurate positioning.

J-93—Lead Screw Tapping Machine

The line of tapping machines manufactured by the Cleveland Tapping Machine Co., Hartville, Ohio, now includes a new unit, the Model EO Cleveland lead screw tapping machine. Powered by a ¾-hp, 1200-rpm, high-reversal motor, it will tap single holes up to ½ in. National coarse thread in mild steel or, using multiple heads, as many as eight No. 6-32 or four ¼-in. holes. Reversal capacity is 1650 strokes per hour. Either manual or automatic operation is possible and where the work lends itself to such handling, indexing feeds, cross slides and hopper feed may be combined with automatic cycling to provide 100 per cent automatic operation.

The lead-screw feed is said to insure high fidelity of thread form when operating at high speeds, even on Class 3 and 4 fits. The hardened tool-steel lead screw is precision

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56

ground to .0002 in. and has 1¾ in. of full-diameter thread contact with the wear-compensating split bronze lead-screw nut. A wick oiler provides lubrication to lead screw and nut.

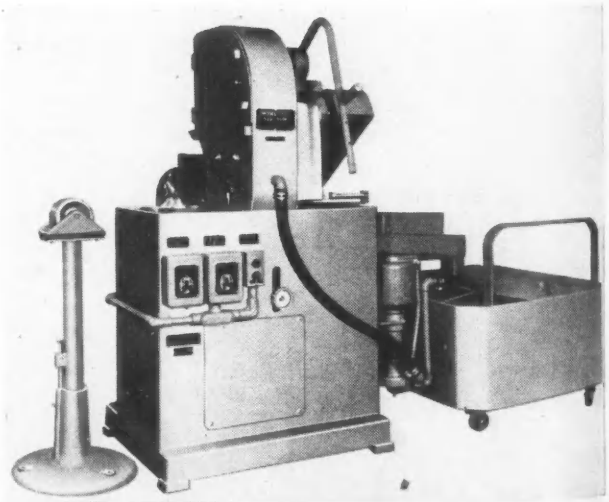
Three optional spindle speed ranges are offered, and spindle speed is changed by a belt change on the multiple-step drive pulleys.

J-94—Wet Abrasive Cutting Machine

The new Campbell Model 223 Bar Cutter is a hand operated wet abrasive cutting machine designed by the Andrew C. Campbell Division of the American Chain & Cable Co., Inc., Bridgeport, Conn., for fast cuts on practically all types of materials up to 2-in. diameter solid stock and 3½-in. diameter tubing.

The new Bar Cutter features a five-in. wheel flange, wheel guides, automatic work stop, automatic coolant pump operation, and automatic hydraulic work clamp. All interior parts, such as work holder, work clamp, etc. are cadmium plated.

A completely separate, wheel-mounted coolant tank is an additional feature of the new Model 223. It permits easy removal for chip cleaning; separate compartments settle out sludge and keep coolant cool. The gusher type pump is completely automatic. The Campbell distributor unit is so constructed that coolant is distributed over the wheel. This is said to result in straighter cuts, cooler cutting and longer wheel life.

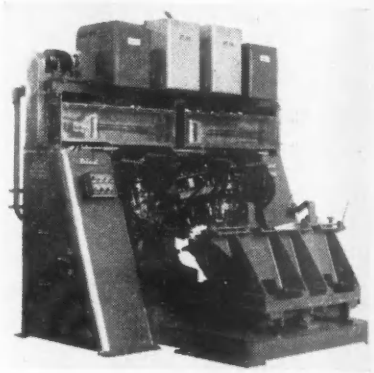


Campbell Model 223 Bar Cutter

J-95—Special Multiple Spot Welder

A special ultra-speed, multiple spot welder for welding automobile dash panels has been built and shipped by the Federal Machine and Welder Co., Warren, Ohio.

This new production tool enables an automobile manufacturer to produce eighty completed parts per



Federal multiple spot welder

hour. To accomplish this, the machine utilizes two ultra-speed units, two water-cooled transformers, and seventy-six hydraulically-operated welding guns.

The ultra-speed units are located where they are easily visible and easily accessible for maintenance. The machine is designed so that the gun units are properly placed for quick servicing of the electrodes.

Mounted on a fabricated steel base, the carriage unit, consisting of a suitable die holder, dies, and necessary locators for positioning the work parts is moved in and out of the welding position by means of a hy-

Press operators know, if they are to prevent scoring and breakage when drawing steel, they must have sheets of *uniformly* high quality from shipment to shipment . . . sheets with uniform chemical composition, mechanical and surface characteristics . . . sheets uniformly free from laminations and surface defects. That's why they like steel stamped *Inland.* It's uniform and so is its performance! Special care is taken in every stage of production to make sure that the Inland steel shipped to them today is identical, in every respect, to the steel they received last week . . . and last year.

"I Like the UNIFORMITY of Inland Steel!"

THE MEN WHO WORK WITH INLAND STEEL KNOW ITS QUALITY!

INLAND STEEL

INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill.
Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul

BARS • STRUCTURALS • PLATES • SHEETS • STRIP • TIN PLATE • FLOOR PLATE • PILING • REINFORCING BARS • RAILS • TRACK ACCESSORIES

draulic cylinder.

The parts are loaded and properly located by clamps after which the operator, by pressing a button, starts the carriage moving into the welding position. As the carriage is positioned, hydraulic valves automatically initiate the welding guns which move into position. The ultra-speed units are started automatically, both moving at once, making four welds at a time. Upon completion of the travel of the ultra-speed units, the guns are automatically retracted, the fixture moves out of the welding machine, and the operator removes the welded assembly. The new assembly parts are then loaded to commence the new cycle.

NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 56

J-96—Boring and Drilling Machine

A special machine, designed and built by Snyder Tool & Engineering Co., Detroit, combines a series of core-drilling, drilling, boring, counterboring, spot facing, chamfering and semi-finish boring operations on heavy cylinder blocks.

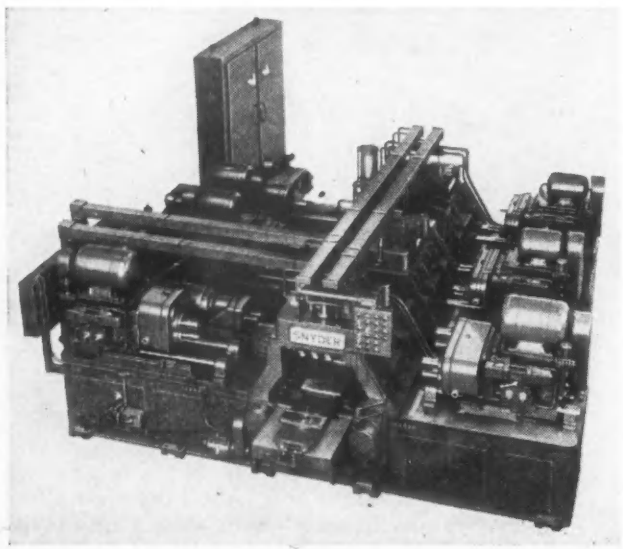
The cylinder block is moved from a conveyor on to first transfer plate, which acts as turn table. The block and transfer plate are indexed 90 deg and the part is then ready to enter working stations, with ends of block facing tools.

Starting of automatic work cycle moves the positioned part to the first work station. The transfer mechanism is hydraulically actuated and transfers eight cylinder blocks simultaneously, each block being moved progressively from station to station until delivered at the end of the machine with all operations completed. As blocks reach work stations, they are hydraulically raised and clamped against the oil pan face, and all heads advance and perform the various operations.

Multiple spindle heads, carrying tools, are mounted on hydraulically-actuated units provided with conventional rapid advance, feed, and rapid return machining cycle.

All units, fixtures and transfer mechanism are provided with interlocking switches to assure proper positioning of all members before machine can start work cycle.

Screw-type chip conveyors mounted in the machine base, and on each side of the transfer mechanism, move chips to a common chip disposal chute. Production is said to be 40 units an hour at 80 per cent efficiency.



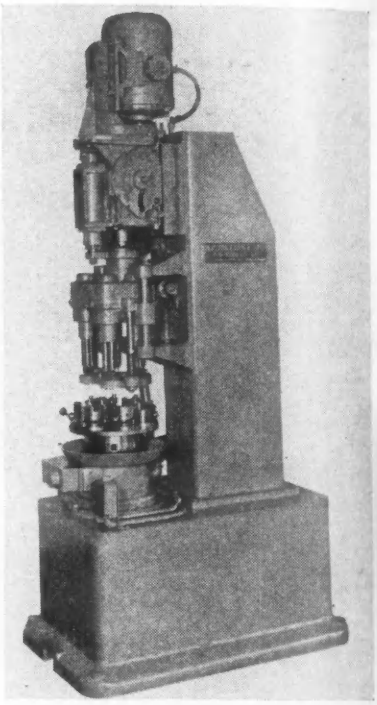
Special Snyder machine

J-97—Automatic Indexing Machine

The latest type Millholland No. 3 vertical automatic indexing machine for high production machining, a new product of W. K. Millholland Machinery Co., Indianapolis 5, Ind., is suitable for performing a variety of operations such as drilling, counterboring, reaming and milling. Horizontal side heads can be used with the machine for performing additional operations.

The machine shown is equipped with a No. 3 Millholland automatic cam feed unit with a 5-hp motor and mounted vertically on a welded steel column. The 15-spindle multiple head is mounted on guide bars and equipped with a bushing plate arranged to register on the fixture at each index.

The power-driven index table is mounted in large-capacity, antifriction bearings and runs in oil. Tables can be furnished with 3, 4, 6, 8 and 12 stations.



Millholland No. 3 vertical automatic index machine

The machine is arranged for automatic continuous cycle, or intermittent operation by push-button control. One piece is completed at each index.

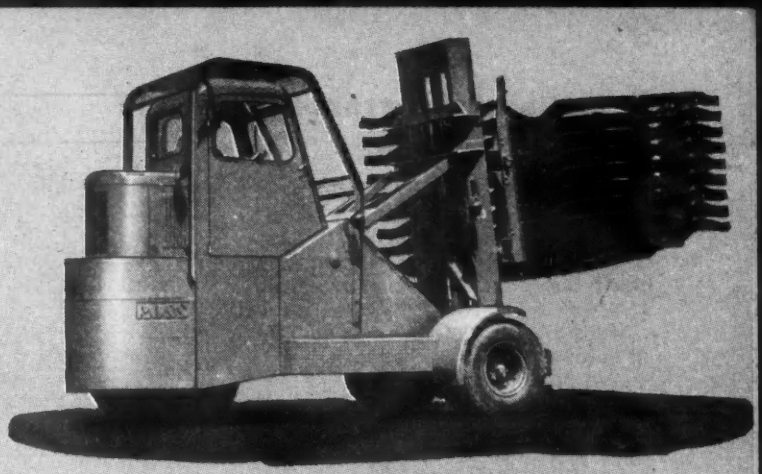
J-98—Heavy Duty A-C Arc Welders

Two new hi-cycle a-c arc welders for heavy duty industrial use have been brought out by the Mid-States Equipment Corp., Chicago. The new models, with 200 and 300 amp output, respectively, feature a unique electrical circuit which is said to hold the welding arc constant with selective heat settings in one-man steps, through a special air-cooled induction type transformer.

The high frequency circuit with remote control at the electrode holder, used in connection with the new units, is particularly adaptable for electronic fluxing and oxide dispersal requirements of the new arc processes such as inert gas shielded arc welding and the Linde Air Products Co. "Heliarc" process. This remote control of the high frequency circuit is claimed to virtually eliminate all radio interference.

The new Mid-States models have no moving parts.

LIFT TRUCKS that LOWER COSTS

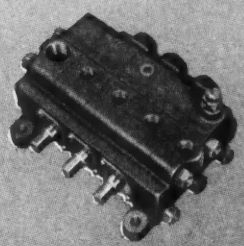


ROSS
Hydraulic LIFT TRUCK
Model 15-HT • Capacity 7½ Tons

USE

VICKERS HYDRAULIC CONTROLS

VICKERS DOUBLE PUMP



VICKERS MULTIPLE UNIT VALVE

VICKERS POWER STEERING BOOSTER

The Ross Model 15-HT Lift Truck shown above is an excellent example of how Vickers Hydraulic Equipment can be used to help reduce materials handling costs. The cylinder that elevates the 7½ ton load at 35 ft per min gets its power from the Vickers Balanced Vane Type Pump . . . as does the tilt unit cylinder. Single lever and simultaneous control is provided by a Vickers Multiple Unit Double-Acting Valve . . . the valve spool construction assures finger tip control regardless of operating pressure; positioning is accurate, quick and easy. An integral relief valve automatically protects the hydraulic system against damage by overload.

This Ross Lift Truck has greater close quarter maneuverability because it is equipped with Vickers Hydraulic Power Steering. Effortless steering is a certainty as the power required for steering is provided by the Vickers Balanced Vane Type Pump. Adequate power is instantaneously available to meet any requirement. Safety in steering is assured as no reaction to the steering wheel is possible when bumps, chuckholes, etc., are encountered. Trucks handle more easily, more speedily, and with less operator fatigue.

For further information regarding the versatility and other advantages of these Vickers units, ask for the following bulletins: Vickers Vane Type Pumps . . . Bulletin 36-12; Vickers Multiple Unit Valves . . . Bulletin 40-13; Vickers Power Steering Booster . . . Bulletin 47-30. 3437

VICKERS Incorporated • 1428 OAKMAN BLVD. • DETROIT 32, MICHIGAN
DIVISION OF THE SPERRY CORPORATION

Application Engineering Offices:—ATLANTA • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • LOS ANGELES • NEWARK PHILADELPHIA • PITTSBURGH • ROCHESTER • ROCKFORD • ST. LOUIS • SEATTLE • TULSA • WASHINGTON • WORCESTER

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT FOR 27 YEARS

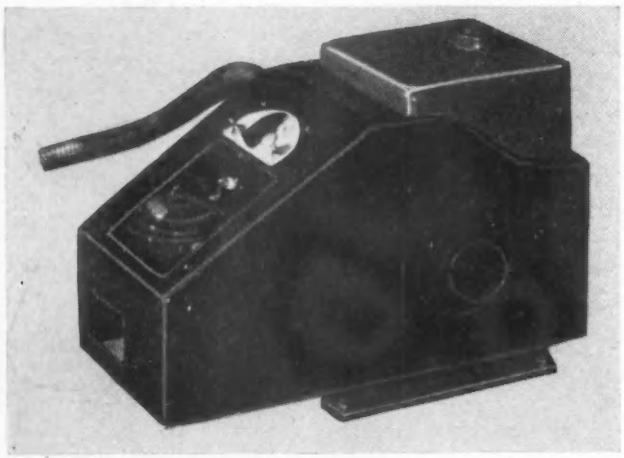
K-98—Light Portable Power Source

Continental Motors' Detroit plant is now in production on a radically new many-purpose power tool which is scheduled for Spring introduction under the registered name of "Multi-Tool".

Multi-Tool is a light, portable power source of 1½ hp capacity engineered to the varying needs of hundreds of different jobs. Any speed from 1600 to 2600 rpm is obtainable by means of a speed control dial on its housing, and the range can be widened still further in both directions by the use of accessory equipment. Positive built-in speed control is said to maintain speed regardless of load, once the dial has been set. Power is delivered either direct from the main shaft or through an automatic transmission which is part of the optional equipment.

The unit is described as weighing about 50 lb and as being easy to carry, owing to its convenient shape and to the provision of rounded handholes at either end of the housing.

With its utility shaft Multi-Tool will bore holes in wood or metal, at the low speeds required by large wood augers, or the high speeds suited to small twist drills. It will sand, grind, scratch, buff or polish at the speed best suited to each use. It can be taken to the field for on-the-spot drilling, grinding or filing. Mounted on its utility base, it may be set on the floor or ground, and belted to any of numerous machines in the shop.



Continental Motors Multi-Tool

K-99—Extra Large Transmission

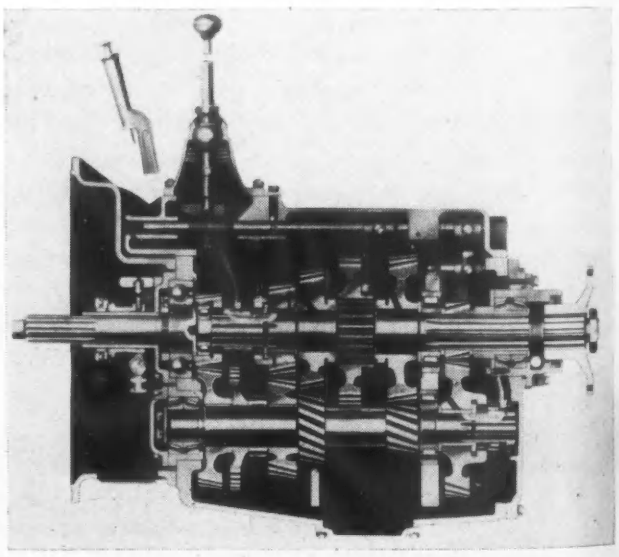
An extra-large, five-speed transmission, for use with the largest automotive engines and commercial trucks, has been placed in production by the Fuller Manufacturing Co., Kalamazoo, Mich.

The new transmission, Model 5A1120, is similar in construction to Fuller's Model 5A920. It provides the same gear ratios as the earlier model, but has even greater capacity. The Model 5A1120 is built for engines with a piston displacement up to 1120 cu. in.

Model 5A1120 features all helical gearing in the forward speeds, three-point bearing suspension for the main shaft, and maximum-capacity bearings in all positions.

Standard gear ratios in the forward speeds are: fifth, .744 to 1; fourth, 1.00 to 1; third, 1.76 to 1; second, 3.27 to 1; and first, 6.54 to 1. Optional gear ratios of .636 to 1 in fifth speed, and 3.08 to 1 in second speed also are available. The standard gear ratio in reverse is 6.49 to 1, with an optional gear ratio of 5.06 to 1 also available. The weight of this extra-large transmission, with standard controls, is 681 lb. Length of the unit is 31-7/32 in.

The front end of the transmission is arranged for the assembly of either standard single or two-plate clutches. Four studs are assembled in the rear face of the transmission case for the attachment of an additional support.



Fuller Model 5A1120 transmission

NEW ★ PRODUCTS

For additional information regarding any of items, please use coupon on page 56

K-100—Seam Welding Electrode Metal

A new seam welding electrode metal which is said to give improved life and reduced cost per weld, has been developed specifically for resistance welding by P. R. Mallory & Co., Inc., Indianapolis 6, Ind. This new material, known as Mallory 22 Metal, is a high-conductivity, copper-base alloy containing cadmium and zirconium.

The high conductivity and hardness with its resistance to annealing makes Mallory 22 Metal a versatile electrode alloy not only for coated metals such as galvanized iron, terne plate, etc., but ordinary carbon steel as well.

K-101—Cylindrical Roller Bearing

The Rollway Bearing Co., Inc., Syracuse, N. Y., announces Tru-Rol, a new precision cylindrical roller bearing with steel retainer.

The new distinctive Tru-Rol one-piece steel retainer with pockets having deep, broad, double flanges, or guide lips in which the rollers are

(*Turn to page* 58, *please*)

Before YOU TUNE-UP MECHANICALLY ... TUNE-UP CHEMICALLY!

Before you tune-up an engine, make sure it is "Chemically Clean". Just add Permatex Toon-Oyl to crankcase oil, warm up engine and let it idle. Sludge and carbon-gum binders that interfere with the smooth operation of valves, piston rings, oil lines and oil screens, will be loosened, disbursed and dissolved!

Then, you'll have a "Chemically Clean" engine, ready for your accurate mechanical adjustments!

℞ ADD 1 QUART OF PERMATEX TOON-OYL TO 5 OR 6 QUARTS OF ANY TYPE OF MOTOR OIL IN THE CRANKCASE

PERMATEX COMPANY, INC., BROOKLYN 29, N. Y.

PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

H-112—Cutting Fluids

Esso Standard Oil Co., Engineering Div.—An attractive booklet on cutting fluids contains detailed recommendations for the selection of cutting fluids as well as other pertinent information on the use of these important metal working tools. Two charts, Machinability Rating Chart and Recommendations for Cutting Fluid Applications, are included.

H-113—Hydraulic Power Units

Vickers, Inc.—The company's custom-built hydraulic power units are illustrated and described in a new folder which also lists the advantages of the units and includes application photographs.

H-114—Oil Filters

Vickers, Inc.—A new folder describes proportional type oil filters for hydraulic systems. Features of the filter are listed, together with a cutaway drawing, diagram of typical hydraulic circuit showing application of Vickers proportional type oil filter for one-way filtering action; specification and installation data.

H-115—Dew-Point Recorder and Atmosphere Selector

Surface Combustion Corp. — The Surface Dew-Point Recorder and Atmosphere Selector are described in a new 4-page bulletin SC-137. It describes the many industrial uses of the Recorder in the heat treating, chemical and other industries.

H-116—Insert Tools

Carboloy Co. Inc.—A 6-page supplement to its general tool catalog, GT-200, covers the expanded line of insert tools with mechanically held solid Carboloy Cemented Carbide bits. The standard round, square, rectangular and triangular bits available in various sizes are also given, together with bit holders with their mechanical clamping devices and adjustment means. Grinding, setup and adjustment instructions for the complete line of Carboloy insert tools is included.

H-117—High Speed Taps

The Sheffield Corp. — A 64-page handbook of tap data and catalog information on Sheffield high speed commercial and precision ground taps, both standard and special is now available. Thread and tap terminology is explained in text and diagrams, information is included on the following—prices, discounts, how to order, tapping practice, specifications and standards.

H-118—Vibrating Work Loader

The Landis Tool Co.—Bulletin VL-48 contains engineering data, illustrations and prices on the No. 1 Vibrating Work Loader. Feed tube selection charts for short and long work pieces are included, together with diagrammatic illustrations.

H-119—Cost Histories

New-Britain Gridley Machine Div., The New Britain Machine Co.—The company has released the first of a continuing series of cost histories prepared in folder form. It contains studies of multiple spindle chucking and screw machines and precision boring machines.

(*Please turn to page* 62)

TIME SAVER COUPON for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

Readers' Service Dept.,
Automotive Industries,
Chestnut & 56th Sts., Philadelphia 39, Pa.

Please send me: **These FREE Publications** (Use letter and designating number of each item desired)	*Please send me more information on:* **New Production and Plant Equipment** (Use letter and designating number of each item desired)	*Please send me more information on:* **New Products** (Use letter and designating number of each item desired)
....	....	....
....	....	....

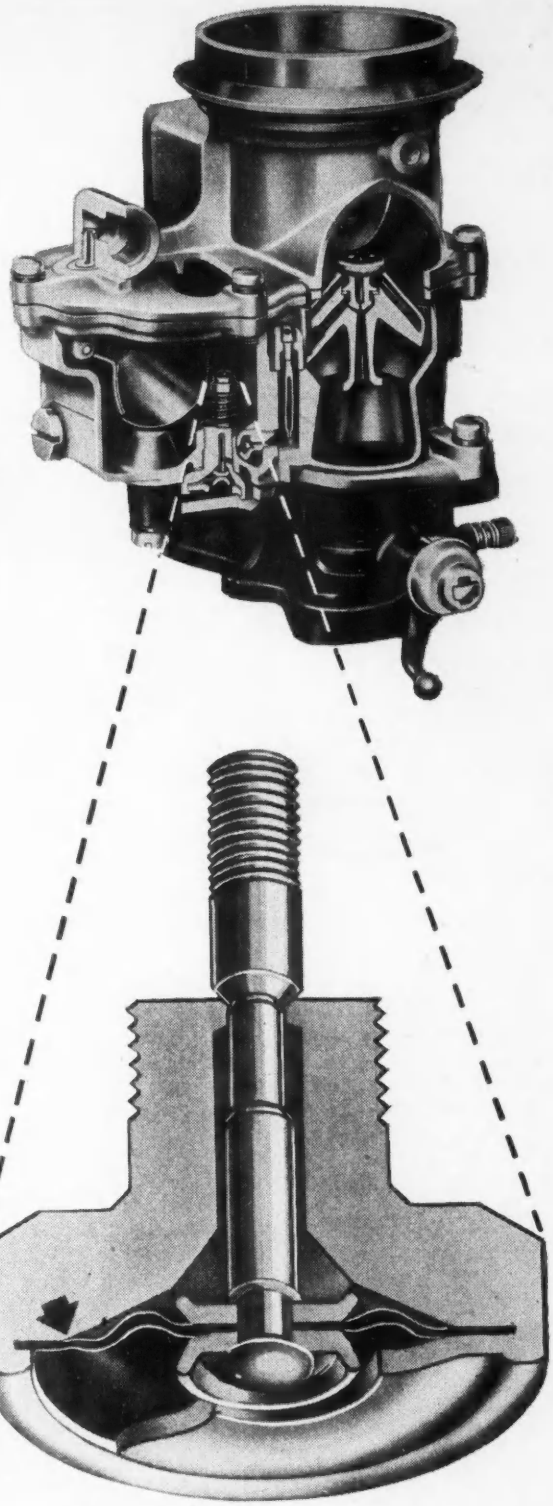
Your Name ..... Your Title .....

Your Company Connection or Business .....

Address .....
(Street & No.) (City) (Zone) (State)

HOLDS GAS UP...

SHOOTS COST DOWN



Good ten years ago—good today! In 1938, Holley Carburetor Co. developed the fuel economizer valve you see here. It is operated by suction, from below the throttles, acting on a diaphragm held by spring tension. At low throttle openings, the vacuum draws down the diaphragm, which closes the valve, checks the flow of fuel and produces a more economical mixture.

For the diaphragm in this economizer, Holley needed a material that would flex freely during long periods of engine operation. It had to work efficiently in contact with all types of fuels at temperatures up to 250°F. It had to be reasonable in cost. And it had to have long life. The Holley Co. chose a material that it had been using successfully in carburetor diaphragms since 1935 . . . Du Pont "Fairprene"* coated fabric. And today, "Fairprene" is *still* its first choice!

"Fairprene" is extremely tough, yet is light in weight, and makes a highly sensitive diaphragm. It resists gasoline, oil, grease, kerosene, and aging in air, oxygen or gases. And it stays flexible at both high and low temperatures . . . has low permanent set and drift. "This economizer," says Holley, "could not be produced without a material like 'Fairprene.'"

Hundreds of manufacturers are improving old products . . . and making better new products . . . by using Du Pont "Fairprene" coated fabric. It will pay you to investigate the possibilities of "Fairprene" for your own use. Du Pont Technical Service will gladly work with you in engineering special grades of "Fairprene" to meet your specific needs. For more detailed information, just clip the coupon below.

*"*Fairprene*" *is Du Pont's trade mark for its line of products made from synthetic elastomers. Available in the form of Coated Fabrics, Sheet Stocks without fabric insert and Adhesives.*

DU PONT FAIRPRENE
TRADE MARK
• COATED FABRICS • SHEET STOCKS
• INDUSTRIAL ADHESIVES
Engineered to do your job better

DU PONT
REG U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.).
Fabrics Division AI-2.
Fairfield, Connecticut

Please send me the latest Technical Bulletin on "Fairprene" Coated Fabrics, Sheet Stocks and Industrial Adhesives.

*Name*_____ *Title*_____

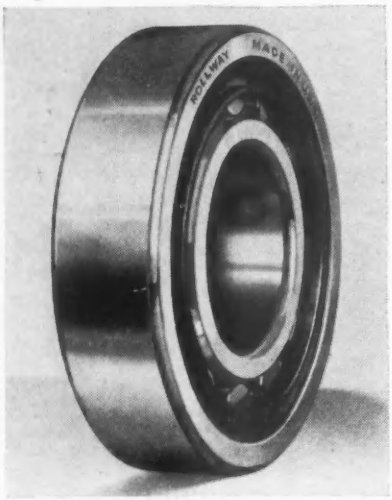
*Firm*_____

*Address*_____

(*Continued from page* 54)
kept in alignment, is said to insure long life by the correct guiding of the rollers.

Additional bearing components are the outer race with deep, accurate ring grooves in the inside diameter into which fit the heavy snap rings that retain the roller retainer and rollers in the outer race which make up the roller assembly. The inner race is separate and is interchangeable.

Tru-Rol bearings are manufactured in a range of sizes conforming with



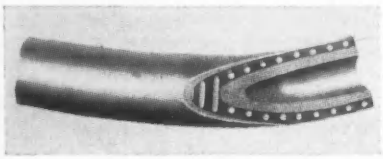
Tru-Roll bearing

S.A.E. standards for roller bearings. The BE-1200 and BE-1300 series correspond to the single-row type of the 200 and 300 size, respectively. The BE-5200 series corresponds to the wide type. Any Tru-Rol bearing can be applied using the inner race, or without the inner race, depending upon the application required.

K-102—A-C Introduces Flexible Lines

A new product, flexible lines for gasoline, grease, vacuum, oil filters and oil gages, is now being introduced by AC Spark Plug Division of General Motors Corp. at Flint, Mich.

AC flexible gasoline, oil gage, grease and vacuum lines are said to be built to highest quality and S.A.E.



Cut-away view of AC flexible line

standards, with factor of safety at least 30 times service requirements. They resist the action of aromatic fuels, high octane gasoline, oils, water, heat, cold, vibration, kinking and twisting. Minimum burst pressure is 1800 psi.

NEW ★ PRODUCTS

for additional information regarding any of these items, please use coupon on page 56.

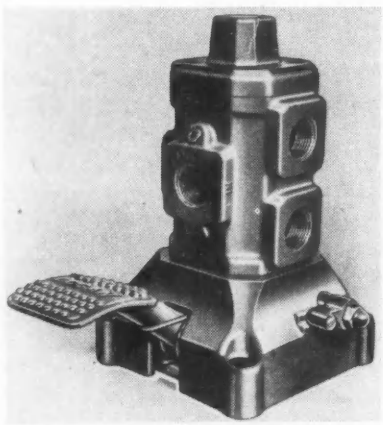
Features of AC flexible lines are: An inner hose of special formula synthetic rubber bonded to the outer body of thick woven fabric, in which the spiral reinforcement steel wire is interwoven. The outer coating consists of many layers of flexible, tough aluminum lacquer.

The factory method of attaching permanent fittings under pressure is said to assure a leakproof joint for the life of the hose.

K-103—Four-Way Hydraulic Valve

Latching or free control of double-acting hydraulic cylinders is provided in the foot-operated, four-way Logan hydraulic valve, recently introduced by the Logansport Machine Co., Inc., Logansport, Ind.

The Model 7025 is a balanced pressure valve of the sliding piston type.



Logan foot-operated hydraulic control valve

It is designed without valve seats or packings other than the stem seals at each end, which are subject to only exhaust pressures. The vertical position of the valve body permits a compact unit. The base area of the various size valves ranges from 5-3/8 to 7-1/8 sq in.

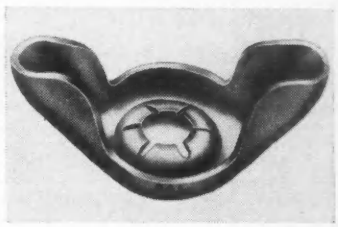
The new Model 7025 valve is available in standard port sizes from 1/4 in. to 1 in. and is designed for oil hydraulic service at pressures to 1500 psi. Special valves for operating pressures to 2500 psi in oil hydraulic circuits, and to 1500 psi in water hydraulic service, may also be obtained.

This dual purpose valve provides two distinct types of control, both obtained from the single operating treadle. Selection is made by means of a lever located on the right hand side of the valve base.

K-104—Self-Locking Wing Nut

A new self-locking wing nut has been brought out by the Palnut Co., 60 Cordier St., Irvington, N. J. This wing nut employs the same type of thread engagement used in other "Palnuts". The use of the "Palnut" design provides vibration-proof qualities in a low priced wing nut, thus pointing the way to a wide range of applications, according to the manufacturer. The proportions of the wing structure have been designed to provide a comfortable finger grip, yet it is not so large as to be bulky in size or appearance.

The locking part of the "Palnut" is essentially a cone with a hole in



Self-locking wing nut made by the Palnut Co.

the center, whose inner edges are formed to the pitch of the screw thread. This inner edge is slotted to form spring jaws which close in and grip the screw thread when the "Palnut" is tightened. The No. 10-24 size is now available from stock, while the ¼ in.-20 size will soon be in production.

K-105—Emulsifiable Solvent Cleaner

A new emulsifiable solvent cleaner that dilutes with water for cleaning of metal parts in pressure spray-type washing machines, has recently been announced by Oakite Products, Inc., New York. Oakite Composition No. 97 forms water emulsions suitable for spray application in single or multi-stage metal washing machines for cleaning steel, brass, aluminum, zinc and other metals before electrocleaning or prepaint treatment or between processing operations.

Among the features claimed for Oakite Composition No. 97 are: (1) its surface-active agents speedily

(*Turn to page* 60, *please*)

"With this ring..."

With this ring most of the best cars on the highways go along smoothly, year after year, like the ideal marriage. Sealed Power has been the original equipment choice of leading engineers since 1911. With their help, Sealed Power facilities have today reached an all-time peak of excellence. You are invited to use the full resources of Sealed Power to make your good engines even better.

SEALED POWER CORPORATION

MUSKEGON, MICHIGAN • IN CANADA: STRATFORD, ONTARIO

SEALED POWER PISTON RINGS

PISTONS • CYLINDER SLEEVES

New Products

(*Continued from page* 58)

penetrate and loosen deposits so that they readily flush away under the impact of cleaning and rinsing sprays; (2) at recommended concentrations it shows no tendency to foam; (3) since the emulsions do not hold soils in permanent suspension, their effective life is prolonged and nozzle-clogging reduced; (4) a temporary rust-retarding film remains on work; (5) added to rinse water in small quantities, material minimizes water-spotting; (6) the water emulsions present no fire hazards and do not give off toxic vapors; (7) solid-particle dirts are effectively removed.

K-106—V-Belt for Heavy Duty Drives

Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J., has added a newly-developed Ray-Man V-belt to its line of industrial rubber products.

The new Ray-Man V-belt was developed to meet the need for a belt possessing features particularly applicable to tough, rugged drives. According to the manufacturer, the engineered strength members have been especially designed for this type of service, and added features of oil, heat and static resistance provide a belt with qualities for unusual service requirements.

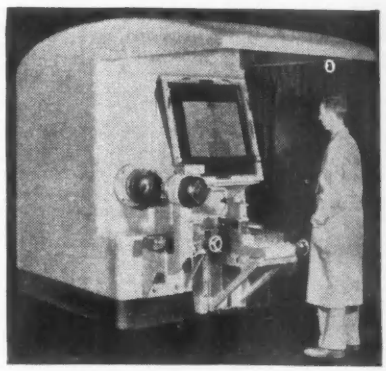
Essential to smooth performance . . .
POSITIVE MOTOR TEMPERATURE CONTROL
DOLE
THERMOSTATS
...in a range of types for every car

Superior motor design, which emphasizes effective cooling system control, is important in achieving name-building performance. At all seasons, a Dole Thermostat contributes to faster warm-up with appreciable savings in gas, oil and motor wear.

THE DOLE VALVE COMPANY
1901-1941 Carroll Ave., Chicago 12, Illinois
LOS ANGELES • DETROIT • PHILADELPHIA

K-107—Lens for Optical Comparators

The Jones & Lamson Machine Co., Springfield, Vt., recently designed a 434 mm projection lens for use on the J & L special blade-checking optical comparators to inspect foil contours on turbine blades. This new lens system will take in a six-in. diameter inspection area and project it at given magnifications on a 30-in. square screen. The lens aperture is 6⅝ in. in diameter. It has a back focal length, or working clearance of 12½ in. A specially designed condensing lens is a part of this equipment.



J & L optical comparator

K-108—Expanding Milling Spacers

The George Scherr Co., New York, N. Y., has placed on the market a line of Euco Micrometric expanding milling spacers to be used in gang and straddle milling. The new Euco spacers are hardened and ground throughout. They are heat-treated to a hardness of 590 Brinell and a tensile strength of 130 tons per sq in.

The fine threads used on the spacers are claimed to withstand any pressure used in tightening the cutters on the milling machine arbor. Euco Micrometric expanding milling spacers enable the set-up man to assemble milling cutters in any desired combination and to an accuracy of .0005 in. The spacers consist of an outer sleeve moving telescopically on a fine thread and an inner sleeve keyed to the arbor. The fine adjustment is made by turning the outer sleeve which is graduated in half thousandths of an inch.

Which is really Ann Sheridan?

STARRING IN "Silver River" A WARNER BROS. PRODUCTION (See answer below)

Spark plugs also look alike, but

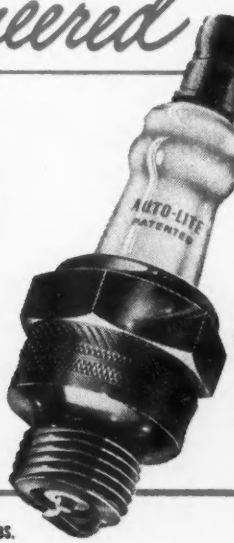
AUTO-LITE SPARK PLUGS

are *"Ignition Engineered"*

YOU'LL agree it's difficult to pick the real Ann Sheridan from these two photographs. It's difficult, too, to pick the best spark plug *from outside appearance*. Spark plugs *may* "look alike," but there's a simple way to be sure you get the best. Ask for Auto-Lite, the spark plug that is ignition engineered—designed by the same engineers who design the entire electrical life-line from battery to coil to distributor to spark plug for many of America's finest cars.

Score yourself 100% if you picked the girl at the right as the real Ann Sheridan, beautiful and talented actress soon to be seen in Warner Bros.' thrilling new hit "Silver River." At left is Miss Peggy O'Connor of Washington, D. C., who looks so much like Miss Sheridan that a restaurant recently spotlighted the table where she was sitting.

You will be 100% right, too, when you switch to Auto-Lite Spark Plugs, specified as original factory equipment on many leading makes of cars.



Switch to AUTO-LITE

MONEY CANNOT BUY A BETTER SPARK PLUG

AUTO-LITE MEANS PRECISION MANUFACTURING

Toronto, Ontario — THE ELECTRIC AUTO-LITE COMPANY — Toledo 1, Ohio

Listen to Auto-Lite's radio program, YOUR THURSDAY NIGHT MEETING starring Dick Haymes, Gordon Jenkins' Orchestra, Thursday 9:00 P.M., E.T. CBS.

PUBLICATIONS AVAILABLE

(*Continued from page* 56)

H-120—Multi-Rib Thread Grinding

Ex-Cell-O Corp.—The April issue of Tool Tips contains an illustrated article on multi-rib thread grinding. It describes several methods of converting from single rib to multi rib grinding on Ex-Cello-O precision thread grinders.

H-121—Abrasion Resisting Steel

Joseph T. Ryerson & Son, Inc.—A new bulletin describing abrasion resisting steel plates and sheets and giving typical applications and performance records has been issued. Information includes heat treatment and fabrication and illustrations of uses in different fields.

H-122—Magnetos

Fairbanks, Morse & Co.—Bulletin FM 75C describes and illustrates twenty magnetos in the FM line. These magnetos are made in standard and heavy-duty models and include, in some applications, variations such as radio shielding, special mounting, etc. Units are available for engines of one, two, four and six cylinders.

H-123—Chromium Plating

Chromium Corp. of America — A revised catalog designed to provide helpful information for successful applications of industrial chromium plating has been announced. The 36-page illustrated publication outlines the accomplishments of chromium plating and describes performance to be expected under known operating conditions. Supplementing the information, research facilities and technical advice are offered in solving specific problems of wear and corrosion. Description of the characteristics of chromium plating, together with tables and charts complete the catalog.

H-124—Micro Projectors

George Scherr Co. — A 6-page folder describes models A and B of the Wilder Micro Projector. It contains several illustrations showing the instrument in use and also features on its front page an interesting photograph showing the diversified types of work that are regularly inspected and checked by means of the projector. Illustrated also are a number of accessories such as the micrometer cross slide, the center support, the surface illuminator and the gear testing attachment all of which constitute optional equipment.

H-125—Drillers and Tappers

National Automatic Tool Co.—A new 20-page illustrated bulletin with complete specifications on the new NATCO H-5 and H-6 multi-spindle drillers and tappers has been issued. The colored booklet is completely indexed and contains all essential facts about both heavy-duty and standard H-5 and H-6 machines.

H-126—Self-Centering Turret

Howe & Fant, Inc. — 12-page booklet has been released describing the Lign-o-matic Turret. Complete explanation of patented design features; operating instructions; specifications and prices are included.

(*Please turn to page* 64)

a name identified with good MOTOR performance

Lamb Electric

Specially designed for each particular application and with quality and dependability built into every part, Lamb Electric Motors have established a reputation for long, trouble-free performance.

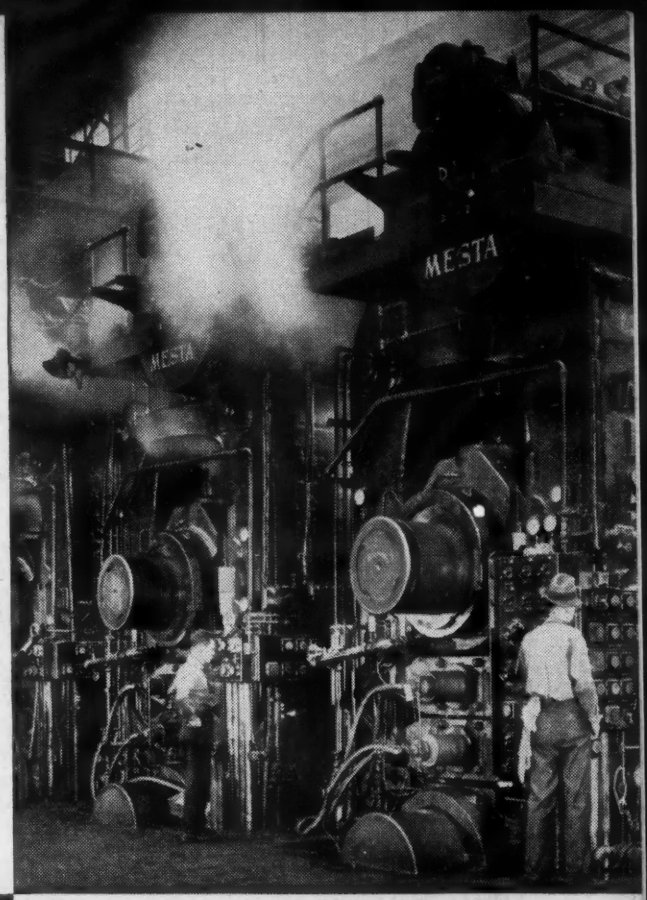
Contributing importantly to this good performance is our experience gained in 31 years of designing and building small motors for over three thousand special applications.

THE LAMB ELECTRIC CO.
KENT, OHIO

Lamb Electric
SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

SUNVIS "900" OILS . . for the toughest lubrication jobs

Sunvis "900" oils are in use today in turbines, circulating systems, hydraulic systems, textile machinery and in many other types of application.



Two years ago, we introduced our Sunvis 900 Oils, Sun's premium grade for industrial use. Since then, Sunvis 900 Oils have been proving their ability to resist oxidation and sludging under the most rigorous operating conditions. They stand up for long periods of continued use at extremely high temperatures without appreciable change in physical characteristics, body, color or neut number." Sunvis 900 Oils possess a high viscosity index and in addition have the unusually low pour-point of 0°F.

Wherever continued operations, high speeds, heavy loads and extremes of temperature combine to threaten your equipment investment . . . wherever lubrication problems are really *tough*—rely on Sunvis 900 Oils. There are distinct grades specially created to meet the requirements of each kind of application. All are fortified against the formation of harmful oxidation products, sludge and rust.

Sunvis 900 Oils assure you of economies through longer equipment life, continuous operations for longer periods between oil changes, less frequent "down time" for inspection and repairs.

For details write to the Industrial Advertising Department for Sunvis 900 booklet.

SUNOCO

SUN OIL COMPANY

Philadelphia 3, Pa.

In Canada: Sun Oil Company, Ltd., Toronto and Montreal

RUGGED— THESE ROPERS ...and Dependable!

PUMPS ENGINEERED TO FIT YOUR NEEDS

Roper manufactures an extensive line of precision-built pumps to serve a multitude of applications in bulk stations, tank trucks, tanker terminals, refineries, and industrial plants. Illustrated are three examples of pumps in Roper series 3600, K, and F — each representative of varying pressure and capacity ranges.

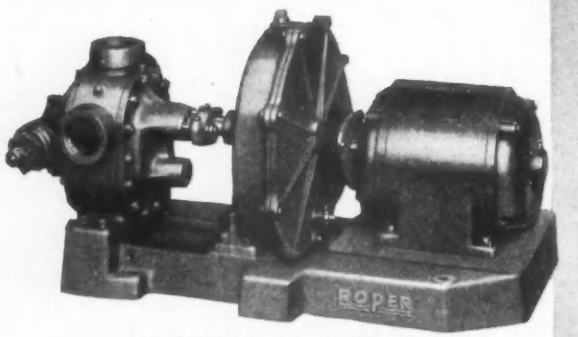


FIG. 3600 MARV—A general purpose motor driven unit designed to handle thin or heavy viscous liquids at slow speeds. Has built-in relief valve, oil enclosed gear guard, babbitted bearing support, bed plate and coupling; fitted for standard motor frames. Other models rated also from 40 to 200 g.p.m.

FOR PRESSURES TO 60 LBS. P.S.I.
CAPACITIES FROM 40 TO 200 G.P.M.

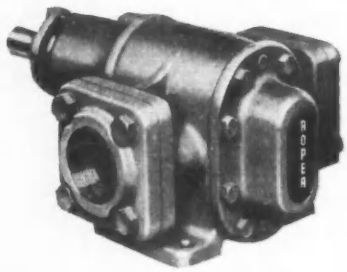


FIG. 1K with Packed Box — Supplied in 30, 40, and 50 g.p.m. sizes with companion flanges. Especially suited for fuel supply or transfer work. New Roper venturi suction and discharge principle minimizes energy loss caused by cavitation, turbulence, or friction. Other models available in ¾ to 50 g.p.m. sizes.

FOR PRESSURES TO 150 LBS. P.S.I.
CAPACITIES IN 30, 40, 50 G.P.M. SIZES

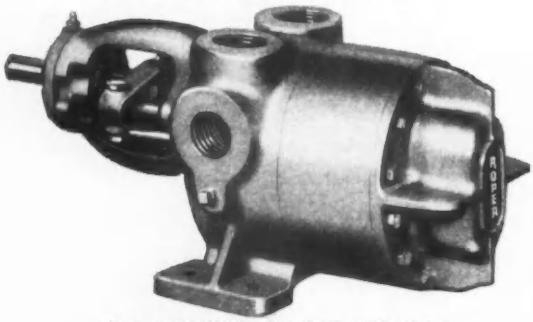


FIG. 1F — Features four-port design offering eight optional piping arrangements. Hydraulic self-lubricating principle prolongs pump life; can be direct connected or belt driven; ideal for pumping clean liquids of all kinds. Other models — including relief valve models — available in 1 to 300 g.p.m. sizes.

FOR PRESSURES TO 300 LBS. P.S.I.
CAPACITIES FROM 1 TO 300 G.P.M.

Send for Catalog on Complete Line

Illustrating and describing pumps built to handle pressures up to 1000 lbs. p.s.i., capacities ¾ to 300 g.p.m., at speeds up to 1800 r.p.m.

ROPER *Rotary Pumps*

GEO. D. ROPER CORP., 605 Blackhawk Park Ave., Rockford, Ill.

PUBLICATIONS AVAILABLE

(*Continued from page* 62)

H-127—Weld Methods

Eutectic Welding Alloys Corp.—A new 8-page bulletin illustrates numerous methods of application and stresses valuable means of avoiding the usual welding problems. It also describes the appropriate welding rod for the particular job. For both oxyacetylene and arc users, complete descriptions of metals, techniques and applications are included.

H-128—Formulated Oils

Welding Equipment and Supply Co.—Bulletin 448 covering Eureka Formulated Oils contains technical data on graphited soluble oil, graphited cutting oil, cutting oil, graphited spindle oil, graphited conveyor lubricants and conveyor grease.

H-129—Tapping Machine

The Cleveland Tapping Machine Co. —A new bulletin describes and illustrates the new Model EO Lead Screw Tapping Machine for high speed, precision single or multiple small-hole production tapping. Examples of tooling and specifications of the new machine are given.

H-130—Safe Driving Pamphlet

Willys-Overland Motors—A pocket-size pamphlet, Smooth Driving, presents a few safety lessons learned on the speed track by a former racing driver. Copies of the booklet may be obtained by writing Willys-Overland Motors, Toledo, 1, Ohio.

Javelin

(*Continued from page* 43)

front to a box-section cross member which supports the rear mounting of the power unit. The suspension and axles, together with the underframe and its front toe plate, sides of the hood, rear seat framing, rear trunk floor, and the insides of the wheel arches form an integral structure to which is welded door pillars, side panels, and roof assembly.

The Javelin is equipped with hydro-mechanical brakes, a four-speed transmission with a steering-column gear shift lever, and a built-in wheel jacking system. Wheelbase is 102 in.

F-Head Engine

(*Continued from page* 39)

point of attachment of the rear semi-elliptic springs, the rear anchorage of the springs being to a cross member in the steel body. The side rails are box section and the diagonal rails are channel section. In addition to the box section cross member at the extreme front, there is a second box-section cross member behind the transmission, to which the rear extremities of the diagonals are welded. It is claimed that this gives a very rigid construction with reduced weight.

Both models have a single plate clutch with a four-speed transmission. The use of a free wheel is continued, and the forward sliding joint of the drive shaft is carried within a rear extension of the transmission. Features of the construction are a built-in heating and air conditioning set and a built-in radio. Under this single chassis, two-engine program, two types of bodies are provided. Wheelbase is 110½ in., with a front track of 51½ in., and a rear track of 55 in. Weight is 2950 lb for the four cylinder model with sedan body and 3070 lb. for the six cylinder job. The first cars to be shown have left hand drives for export, but right hand drive will be fitted for the British market. The four-cylinder model is listed at $3380 and the six at $3460. On the home market purchase tax has to be added to this.

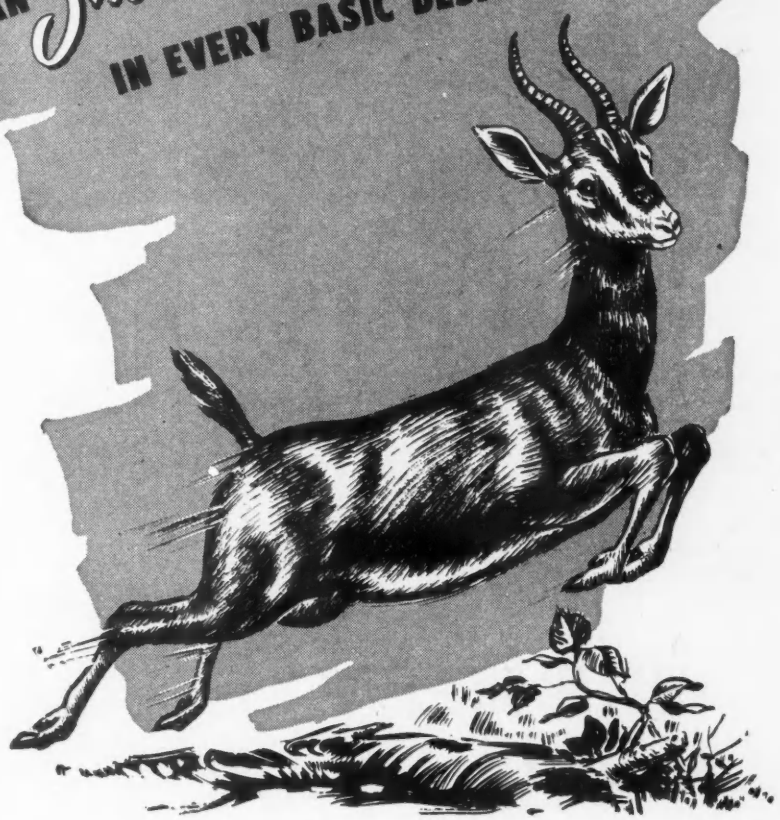
CALENDAR

Conventions and Meetings

Soc. for Experimental Stress Analysis—Annual Mtg., Pittsburgh	May 27–29
Auto. Engine Rebuilders Assoc. Convention, Buffalo	May 27–29
Amer. Soc. Mech. Engineers Semi-Annual Mtg., Milwaukee	May 31–June 5
32nd International 500-Mile Race, Indianapolis	May 31
SAE Summer Mtg., French Lick Springs	June 6–11
Amer. Roadbuilders' Assoc. Road Show, Chicago	July 16–24
SAE West Coast Mtg., San Francisco	Aug. 18–20
Natl. Air Races, Cleveland	Sept. 4–6
SAE Tractor & Diesel Eng. Mtg., Milwaukee	Sept. 7–9
Instrument Soc. of Amer., Natl. Instrument Conf. & Exhibition, Philadelphia	Sept. 13–17
Turin (Italy) Auto Show	Sept. 15–26
Commercial Motor Transport Show, London	Oct. 1–9
SAE Aeronautic & Aircraft Eng. Display, Los Angeles	Oct. 6–9
Paris Auto Show	Oct. 7–12
SAE Production Mtg., Cleveland	Oct. 21–22
London Auto Show	Oct. 27–Nov. 6
SAE Fuels & Lubricants Mtg., Tulsa	Nov. 4–5
Automotive Service Industries Show, Navy Pier, Chicago	Dec. 6–10
SAE Annual Mtg., Detroit	Jan. 10–14
Natl. Auto Dealers Assoc. Convention & Equip. Exhibit, San Francisco	Jan. 24–27
Society of Motor Mfrs. International Motor Exhibition, London	Oct. 28–Nov. 6

SWIFT • SURE • STURDY • SILENT • SMOOTH • STEADY

PLAN *Smooth* GAZELLE-LIKE PERFORMANCE IN EVERY BASIC DESIGN

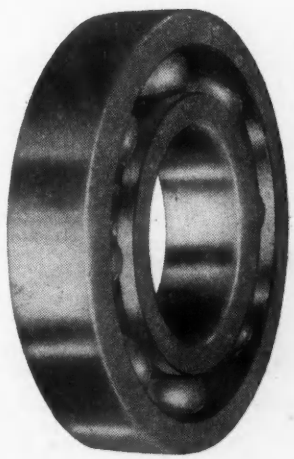


You've often remarked that no piece of equipment can be superior to its component parts...

You appreciate the broad recognition and acceptance of BCA Ball Bearings in industry...

You know you can tell your engineers to draw upon our half-century of experience in friction control practices, encompassing many varied fields of industry...

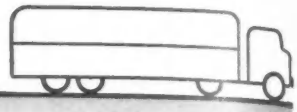
You, who insist upon continuous, full-capacity, trouble-free operation, know this can be assured by specifying BCA Ball Bearings.



BEARINGS COMPANY OF AMERICA
LANCASTER, PENNSYLVANIA

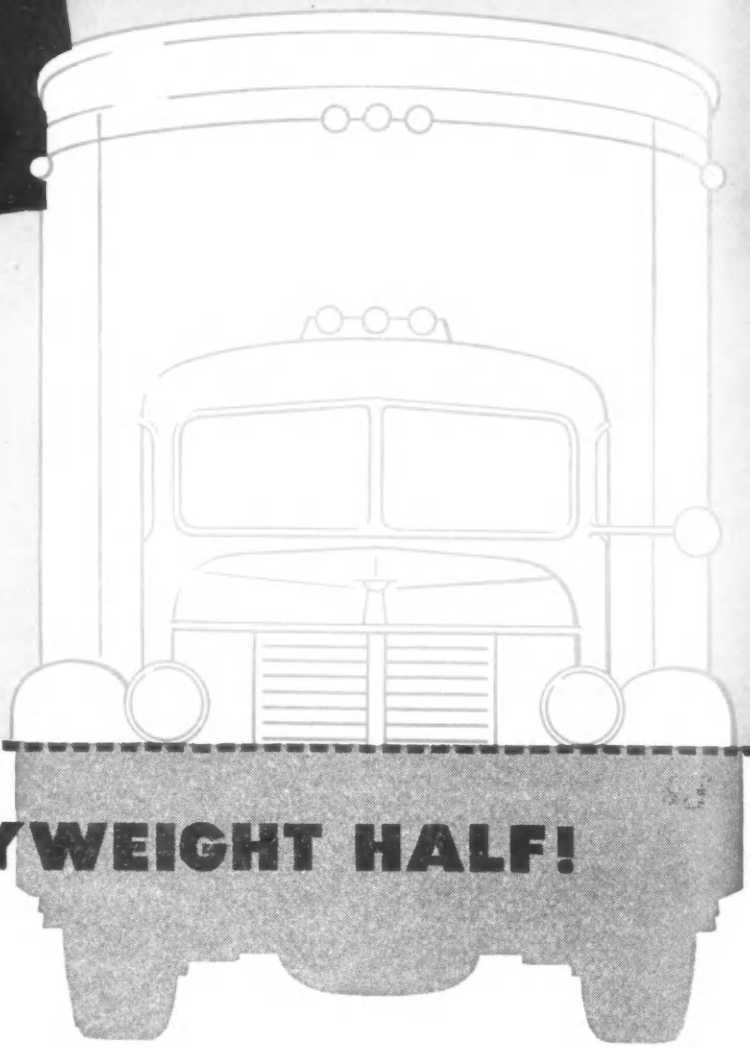
BCA RADIAL · ANGULAR CONTACT · THRUST BALL BEARINGS

ALUMINUM BODY DESIGN IS SAVING TONS OF DEAD WEIGHT—

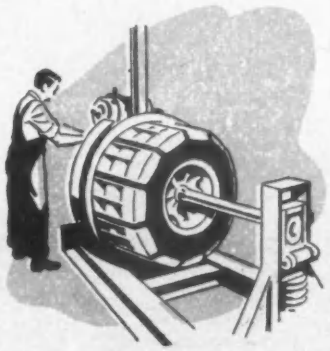


now

lighten up



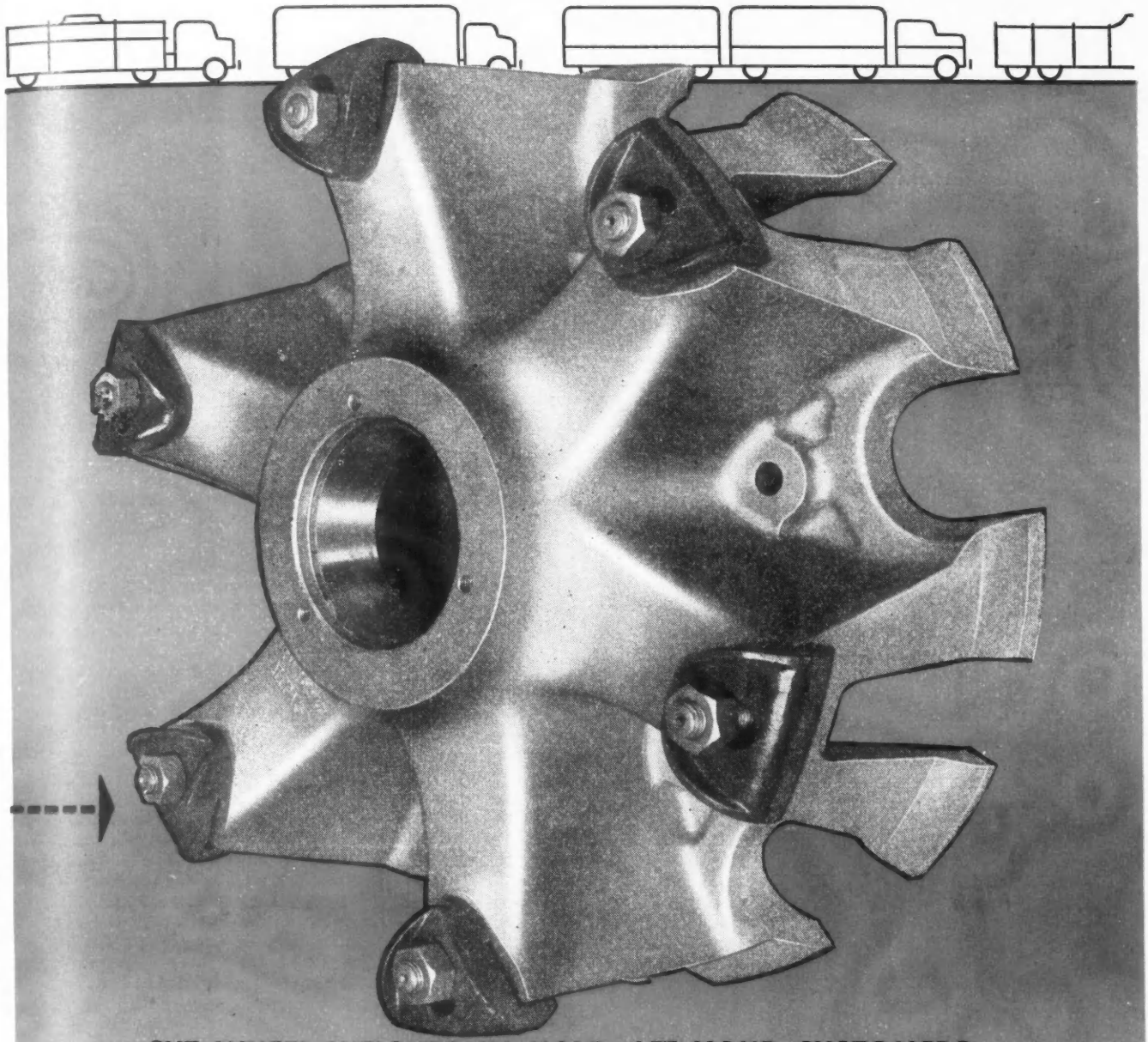
THE HEAVYWEIGHT HALF!



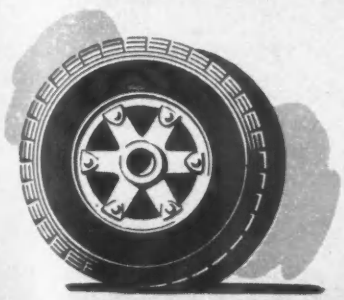
LABORATORY-TESTED—Alcoa laboratories put wheels made from Alcoa Castings through tests that duplicate stress of sharp turns at 50 miles per hour, other tests that check safety factors of aluminum wheels.

ADD PAYLOAD—Up to 200 pounds on a 4-wheel semitrailer, with the same gross weight! Or let bus operators carry two extra passengers with no increase in total weight. **CUT DEAD WEIGHT**—Let fleet operators get more tire mileage, cushion road shock, by reducing unsprung weight.

FOUNDRY-CHECKED—Alcoa quality-control laboratories make sure of conformance to rigid Alcoa standards. X-ray inspection means dependable service from every aluminum wheel on your fleet.



CUT WHEEL WEIGHTS IN HALF—LET YOUR CUSTOMERS HAUL BIGGER PAYLOADS WITH NO INCREASE IN GROSS WEIGHT!



DESIGN CONSULTATION—60 years of light-metal experience—a third of it in co-operation with transportation men—enables Alcoa to help you work out designs for cast aluminum wheels to meet your requirements.

Why not see how Alcoa Aluminum Castings can help you *lighten up the heavyweight half?* Just call your Alcoa representative at the nearby sales office. ALUMINUM COMPANY OF AMERICA, 2110 Gulf Bldg., Pittsburgh 19, Pa.

ALCOA

TRUCK AND BUS WHEELS OF ALCOA ALUMINUM CASTINGS

SHIPMENTS OF COMPLETE AIRCRAFT AND AIRCRAFT ENGINES AND OTHER PRODUCTS OF THEIR PLANTS*

AIRCRAFT

	1948 January
Complete Aircraft	607
For U. S. Military	
Number of Planes	136
Value of Planes	.....
Civil Aircraft	
Personal Type	
Number	458
Value	$2,055,755
Transport Type	
Number	13
Value	$2,498,533
Aircraft Parts, Value	$1,765,706
Value of complete Aircraft and Parts	$6,319,994
Value of All Other Products	$3,006,683
Total Value of All Products	$9,326,677

AIRCRAFT ENGINES

	1948 January
For U. S. Military	
Number of Engines	287
Value of Engines	$15,203,421
Value of Parts	$3,682,458
For Civil Use	
Number of Engines	779
Value of Engines	$3,149,199
Value of Parts	$1,572,186
Total—Engines	
Number of Engines	1,066
Value of Engines	$18,352,620
Value of Parts	$5,254,644
All Other Products, Value	$68,658
Total Value, Engines and Parts	$23,675,922

*—Bureau of the Census and Civil Aeronautics Administration.

Engineered by Borg & Beck
means . . . built to the exacting standards
which have made the name BORG & BECK
famous for 36 years!
BORG & BECK CLUTCH
THE STANDARD
B-W
ENGINEERING
PRODUCTION
You can depend on-
BORG & BECK
FOR THAT VITAL SPOT WHERE POWER TAKES HOLD OF THE LOAD!
BORG & BECK DIVISION
BORG-WARNER CORPORATION
CHICAGO 38, ILLINOIS

Our Future Export Market

(*Continued from page* 35)

service, lack of night flying and low aircraft utility rates.

In sections of Central America and the Amazon basin, a single runway often costs less than three miles of road. Airplanes, therefore, are taking over many of the jobs normally relegated to more conventional means of transport.

Airplanes of European manufacture dominated Latin American aviation before the war, but the situation is now reversed with 400 U. S. built transports in service compared to less than 50 European-built craft. Of the American types, the Douglas DC-3 or C-47 conversion is most popular, with about 270 being operated.

None of these transport planes are particularly suitable for Latin American cargo operations where high rate of climb, load carrying ability, and low landing speed offer greater premiums than top speed. To date, however, Northrop's new Trimotor is the only American design aimed at this market. The British are offering minor competition with their Bristol Freighter, but this situation could change overnight if specialized designs were made available.

While aircraft industries are steadily growing in Latin America, air frame production is still limited to training or light military types. Transport aircraft together with engines, propellers, accessories, spare parts and tools are practically all imported from this country. Sales in this category totaled about $40 million in 1947, with Argentina, Brazil and Mexico being principal buyers in that order.

Agentina alone supplies about half of her requirements for commercial aircraft engines, propellers and other parts. Yet her purchases are about half again as large as our next best hemisphere customer. Some of this Argentine production is also finding its way into Chile, Bolivia and Uruguay, and this trade should greatly expand in the next few years.

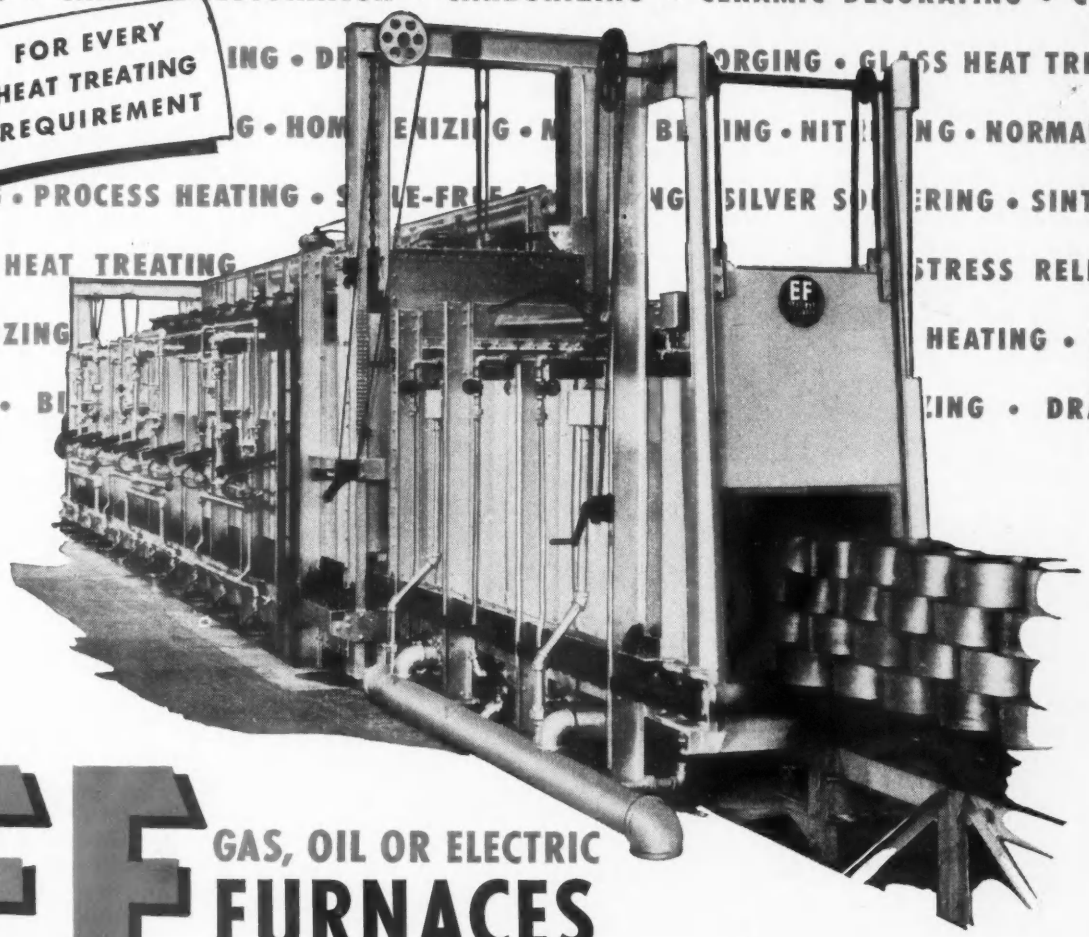
Meteorological instruments and communication equipment are being produced in Mexico, Argentina and Brazil. All the other countries must depend on U. S. suppliers for this material. Tractors, power plants and similar airport equipment are being imported from both Britain and the U. S.

Runway lighting facilities and airway beacons are being installed rapidly throughout Latin America. Mexico alone will spend over $10 million next year for this purpose. Insulated wire, switches, fuses, transformers and other types of electrical

(*Turn to page* 72; *please*)

AGEING • ALUMINUM BRAZING • ANNEALING • BILLET HEATING • BRASS BRAZING • BRIGHT ANNEALING • CARBON RESTORATION • CARBURIZING • CERAMIC DECORATING • COPPER BRAZIN ING • DE ORGING • GL S HEAT TREATING GLASS G • HOM ENIZI G • M BE ING • NIT NG • NORMALIZING PATENTING • PROCESS HEATING • S E-FR NG SILVER S ERING • SINTERING SOLUTION HEAT TREATING STRESS RELIEVING SPHEROIDIZING HEATING • BRASS BRAZING • BI ING • DRAWING

FOR EVERY HEAT TREATING REQUIREMENT



EF GAS, OIL OR ELECTRIC FURNACES

● For the utmost in efficient, dependable, low cost service specify an EF gas, oil or electric heat treating furnace. Engineered and built specially for your particular and individual need, an EF furnace assures the smooth, continuous flow of material through the heat treating processes, and reflects throughout the advantage of many service-proved features conceived and perfected by EF engineers, and available only in EF design. These include the EF radiant tube and EF heat exchanger which combine to assure extremely high combustion efficiency; the EF cast alloy electric heating elements; EF roller design and mounting that minimize servicing and maintenance; EF special atmosphere generators, and many other devices that assure uniform temperature throughout the furnace, accurate control of heat within the required limits, low maintenance, high hourly outputs and uniform, low cost, dependable operation.

Let EF Engineers, with their long experience in all phases of furnace operation, work with you on your next heat treating job!

EF

THE ELECTRIC FURNACE CO.

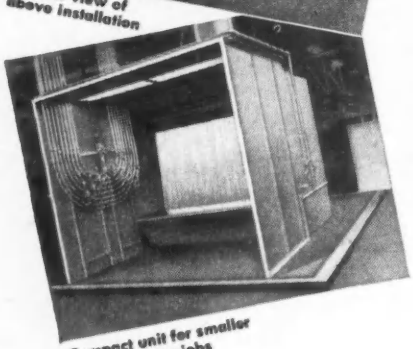
WILSON ST. AT PENNA. R.R.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem-Ohio

Carries Away Overspray . . .
IN A WHIRLING TORNADO OF WATER

Exterior view of above installation



Compact unit for smaller spraying jobs

PAINT-LADEN AIR IS "TORNADO" CLEANED. Operators, working in a Schmieg Centri-Merge Spray Booth, are adequately protected from fire and fumes. Overspray is carried on an air stream *horizontally* away from work into a curtain of water, pressure-fed through slots extending continuously full width of booth, that descends down the flood sheet. The mixture of fume and paint-laden air and water is then whirled under the flood sheet and hurled with tremendous impact against the impingement wall at back of booth. Down this impingement wall flows an additional sheet of water that floods the foreign matter, pounded out in the process, into the sludge tank below. Only CLEAN AIR passes through exhaust fan. Thus the danger of fire is suppressed both in front and behind the flood sheet. Because the ratio of water and air is far greater in Centri-Merge, paint and other gummy substances do not pile up on the hard-to-get-at walls of the chamber behind the flood sheet; therefore, cost of repeated cleanings is eliminated.

Consult Schmieg engineers regarding your problems of dust and fume control.

THE *best* AIR PURGE *is* CENTRI-MERGE

Schmieg INDUSTRIES INC.
Engineers & Manufacturers
310 PIQUETTE AVENUE • DETROIT 2, MICHIGAN

Export Market

(*Continued from page* 70)

equipment are produced locally, but there is still a demand for watt meters and other such special items. Here again, orders will vary according to the dollar credits available in each country. Great Britain has taken over most of Germany's old trade in this field, particularly in Argentina and Brazil where sterling credits are relatively plentiful.

As a general rule, however, U. S. aircraft firms will suffer the least from hemisphere dollar shortages. With few exceptions, top import priorities are being granted for aircraft and parts.

Demand for Motor Transport

Although aviation is supplying benefits that no other form of transport can offer, non-urban population in Latin America is widely scattered and less than one-fifth can be reached by direct-line air service. Hence the insistent, growing demand for motor transport.

The much publicized Inter-American highway project, while deemed impractical by many engineers, has at least focused attention of government authorities on the importance of truck and bus traffic in their plans for economic progress. In particular, it has stirred lively interest in U. S. construction methods and road building machinery.

Latin American highway engineers, who first used our mechanized equipment during the war, reported savings in construction time and costs even where extremely cheap labor was replaced by this machinery. As a result, U. S. leadership in this field is widely recognized south of the border. Many older types of steam shovels and rollers, incidentally, are still being sold in these areas.

The demand for motor vehicles is at an all time high in Latin America, but all imports are limited by the amount of exchange available. U. S. cars and trucks practically monopolize the market in Mexico, Central America and down the west coast of South America. In Argentina, Uruguay and Brazil, European vehicles are beginning to offer substantial competition.

The Buenos Aires community traction company, for example, purchased the following equipment in 1946 and 1947:

50	British buses
506	British bus chassis
400	Italian buses
900	U. S. buses
1200	U. S. bus chassis
130	U. S. trolley buses

The Italian buses, manufactured by Isotta Fraschini, were partial payment for recent Argentine wheat shipments.

(*Turn to page* 74, *please*)

SEE HOW "THE NEW ARITHMETIC IN STEEL"* MAKES EVERY FOURTH PART A BONUS PART

N-A-X HIGH-TENSILE stretches production per ton. Its greater strength and corrosion resistance make it possible to design sections an average of 25% lighter. That means one extra product for every three you are now building.

GREAT LAKES STEEL CORPORATION
N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN
UNIT OF NATIONAL STEEL CORPORATION

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—
N·A·X
HIGH-TENSILE STEEL

COPYRIGHT 1948 GREAT LAKES STEEL CORP.

Export Market

(*Continued from page* 72)

Potentialities of the automotive market in Latin America can be appreciated when one considers that there are fewer than 300,000 cars, trucks and buses in Brazil, compared to some 37 million in this country. That amounts approximately to one vehicle for every 200 people against our ratio of about one to four. Less progressive countries are even worse off. Small wonder that "used" new cars are selling for five and six times the original purchase price in these countries.

Fortunately, extensive facilities are available for assembling automotive equipment in the important countries. Early tariff concessions amounting to approximately 30 per cent on unassembled parts encouraged the erection of such plants, the first appearing in Argentina during World War I, in Brazil in 1920, and in Mexico in 1926. Ford, Chrysler and General Motors are represented in these countries, with Packard and Nash recent entrants in Mexico. In affiliated industries, U. S. Rubber, Goodyear, International Harvester, Crosley Radio and Fruehauf Trailer, to mention a few, have branches or subsidiaries in Latin America.

No figures are available on total U. S. investment in these plants. Brazilian assembly plants of the "big three" are valued at about $150 million.

Normally, individual plants have a capacity of 100 to 200 assembled cars per day. Recent import quotas on parts have cut this figure substantially. Mexico, for example, now limits Ford assembly to 8500 units per year; General Motors, 6500; Chrysler, 4000; Nash, 1000; and Packard, 550. Commercial car production is now emphasized, and further restrictions on passenger car output are probable if trade balances remain unfavorable.

In the non-metallic parts and accessories field, most of the countries are fairly well off. Casings and inner tubes were first made in Argentina in 1931, and about 90 per cent of the demand is now supplied locally. Uruguay, Brazil, Chile, Colombia, Peru and Mexico also supply most of their tire needs except in the extra large sizes. These countries generally utilize domestic cotton for tire fabric and their own sources of natural rubber. Production of flooring mats, battery boxes and other rubber articles is also extensive.

Flat glass is produced in the countries mentioned above, but the total is less than five per cent of U. S. production. Upholstery and other interior furnishings are made locally along with a proportion of the necessary batteries, light bulbs, horns, generators and starting motors. Practically all truck and bus bodies are made by local woodworking firms, and the production of body lacquers is a new and thriving industry.

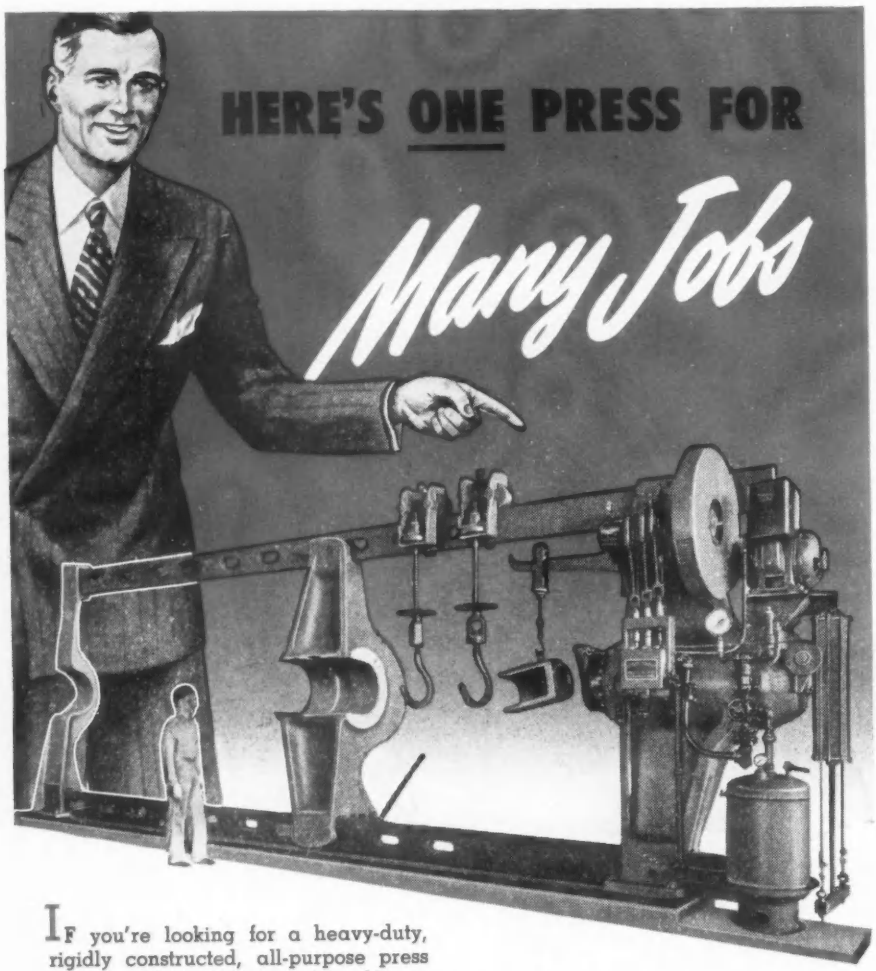
Machine Tools in Demand

The introduction of automatic machinery in the metal working industries was retarded by the extremely low cost labor available. Stepped up production schedules, however, are rapidly changing this picture. Drill presses, lathes and grinders were the most important machine tools imported before the war. Now the trend is toward planers, shapers, boring mills and other types of special machinery. Wood and metal power saws are also finding a new market in the expanding Latin American market.

Argentina is the only country attempting to produce machine tools. Several firms copied foreign designs during the recent war, turning out shapers, mills and presses of fair quality. As soon as the war ended, however, higher cost of the local product discouraged further expansion in this direction.

In 1938, Germany supplied half of the machine tools used in Latin America, while our share in this

(*Turn to page* 78; *please*)



IF you're looking for a heavy-duty, rigidly constructed, all-purpose press for assembly and disassembly of large gears, rolls, armatures and similar parts in general machine shop work, it will pay you to consider the R. D. Wood Hydraulic Wheel Press. This press requires no pit, and it has self-contained pumping unit and controls. A pneumatic pull-back device eliminates counterweights and gives a faster rate of ram return than is obtainable on ballast-weighted devices. Years of R. D. Wood design ingenuity are built into this press . . . your assurance of quick, economical, *dependable* performance of vital general shop work. These Wheel Presses are available in capacities ranging from 100 tons to 1000 tons, with tie-bar clearances ranging from 48" to 120". Send for literature *today*, and remember R. D. Wood engineers are always available for consultation on *all* hydraulic press problems.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE • ACCUMULATORS • ALLEVIATORS • INTENSIFIERS

EST. 1803

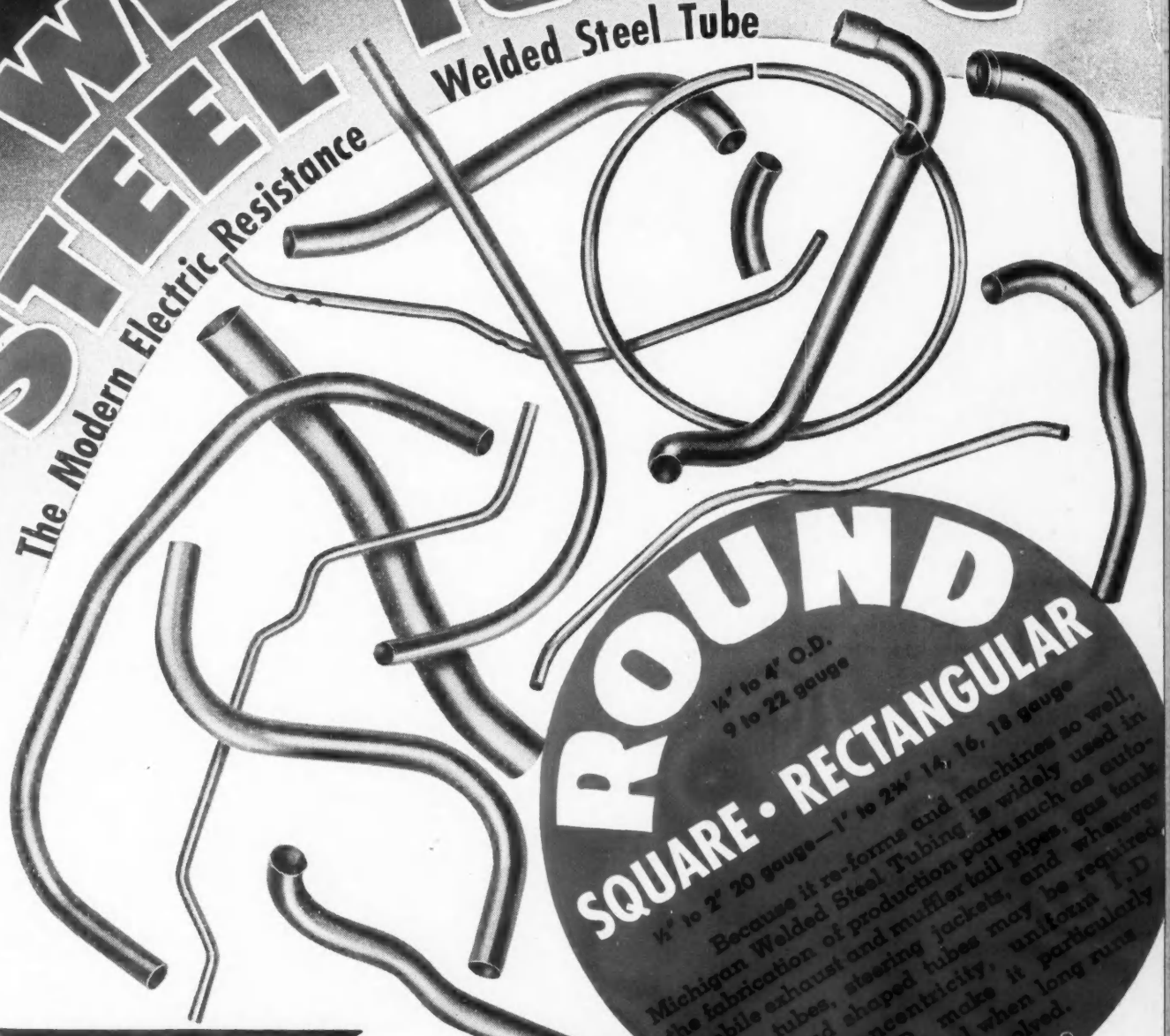
R. D. Wood Company

PUBLIC LEDGER BUILDING, PHILADELPHIA 5, PA.

Michigan WELDED STEEL TUBING

Welded Steel Tube

The Modern Electric Resistance



ROUND

SQUARE • RECTANGULAR

½" to 4" O.D.
9 to 22 gauge

½" to 2" 20 gauge—1" to 2½" 14, 16, 18 gauge

Because it re-forms and machines so well, Michigan Welded Steel Tubing is widely used in the fabrication of production parts such as automobile exhaust and muffler tail pipes, gas tank filler tubes, steering jackets, and wherever bent and shaped tubes may be required. True concentricity, uniform I.D. and O.D. make it particularly economical when long runs are involved.

Can be BENT also . . .

FLANGED EXPANDED · FORGED SPUN · UPSET ROLLED · TAPERED BEADED · FLATTENED FLUTED

Engineering advice and technical help in the selection of tubing best suited to your needs. Address inquiries to:

Michigan STEEL TUBE PRODUCTS CO.

More Than 30 Years in the Business

9450 BUFFALO STREET • DETROIT 12, MICHIGAN

FACTORIES: DETROIT, MICHIGAN • SHELBY, OHIO

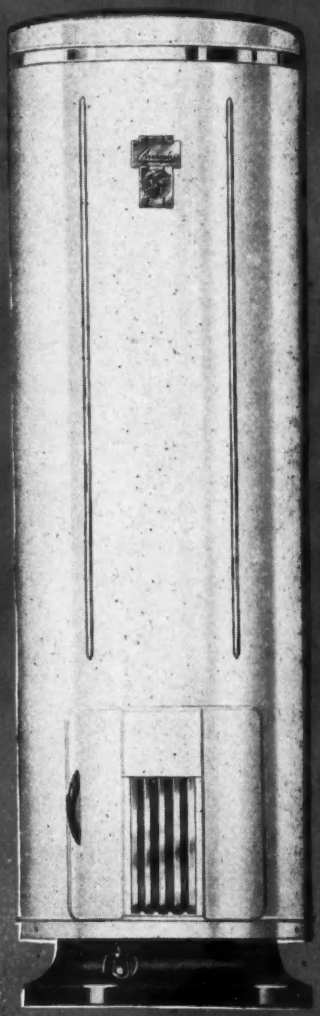
DISTRIBUTORS: Steel Sales Corp., Detroit, Chicago, St. Louis, Milwaukee, Indianapolis, and Minneapolis — Miller Steel Co., Inc., Hillsdale, N. J.—C. L. Hyland, Dayton, Ohio—Dirks & Company, Portland, Oregon—James J. Shannon, Milton, Mass.—Service Steel Co., Los Angeles, Calif.—American Tubular & Steel Products Co., Pittsburgh, Pa.—Strong, Carlisle & Hammond Co., Cleveland, Ohio —Drummond, McCall & Co., Ltd., Toronto, Canada.

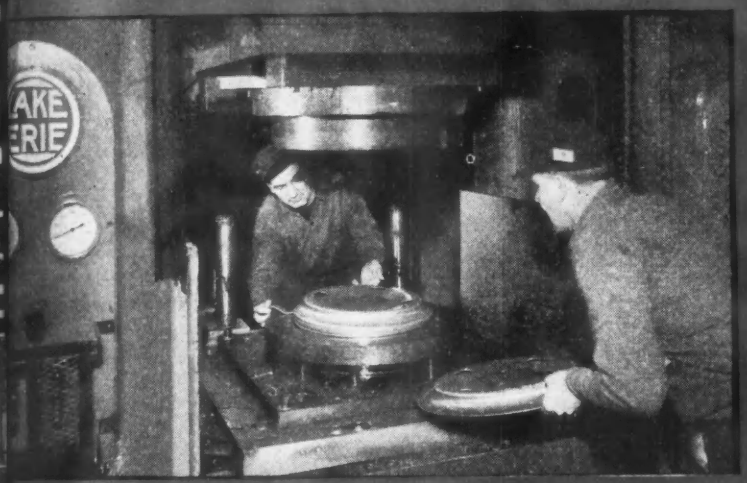
800-TON LAKE ERIE hydraulic downstroke housing type press producing water heater tank parts in the A. O. Smith Corporation plant in Kankakee, Illinois. This is one of many Lake Erie Hydraulic Presses operated by A. O. Smith. Press is a self-contained, single action model with a 125-ton cushion. Working space measures 50″ right to left and 48″ front to back. The main ram has a 60″ stroke and the cushion ram a 15″ stroke. The daylight opening is 60″.

A. O. SMITH
gets top quality HIGH OUTPUT
with LAKE ERIE Hydraulic Press

LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

THE A. O. SMITH Corporation of Milwaukee, Wisconsin report that the Lake Erie Hydraulic Press in their Kankakee plant meets every expectation. In their own words, "It is an excellent press for heavy materials and it is easy to set up and operate. Rate of production and quality of parts are gratifying." Today, leaders in metal forming such as A. O. Smith Corporation are taking advantage of the efficiencies possible with these newer hydraulic presses. They are enjoying increased production, improved product quality and lower unit costs. Why not consult Lake Erie about the possibilities for hydraulic press applications in your production. No obligation whatsoever.





PERMAGLAS automatic water heater manufactured by A. O. Smith Corporation has glass-lined tank, Fiberglas Insulation and many other new features. Tank ends and covers are efficiently produced on Lake Erie Hydraulic Press.

TWO MEN OPERATE the press. One man feeds parts in and the other removes them. Water heater tank heads are produced at the rate of 237 per hour, base plates at the rate of 259 per hour.

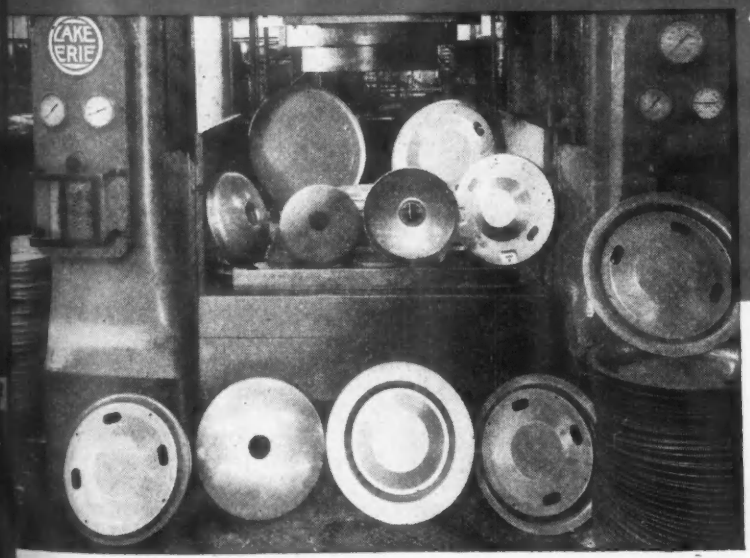


ILLUSTRATION SHOWS various water heater tank pieces produced and operations performed. The press is a versatile unit, easy to set up and operate, and forms heavy material (⅛" sheet steel) with ease and precision.

LAKE ERIE ENGINEERING CORP.

MANUFACTURERS OF
HYDRAULIC PRESSES AND SPECIAL MACHINERY

General Offices and Plant:

509 Woodward Avenue, Buffalo 17, New York

OFFICES IN PRINCIPAL CITIES AND FOREIGN COUNTRIES

LEADING MANUFACTURER OF HYDRAULIC PRESSES—ALL SIZES AND TYPES—METAL WORKING...PLASTICS MOLDING FORGING...METAL EXTRUSION....PROCESSING....RUBBER VULCANIZING...STEREOTYPING...SPECIAL PURPOSE

Save **RIVET-SETTING** *Time!* **... CUT COSTS with**

T-J *Rivitors*

AUTOMATICALLY
FEEDS AND SETS SOLID RIVETS!

You'll do a better job of rivet setting . . . faster. . . with T-J Rivitors! Tests show that with the Rivitor you get a solid rivet joint of 10% to 15% greater strength—a completely filled hole . . . no flashing . . . a neat, balanced head. Geared to speed and accuracy—the T-J Rivitor fits into today's tough production schedules.

The Rivitor cuts costs by using solid rivets instead of more expensive types. Wide range of uses. Write for bulletin. The Tomkins-Johnson Co., Jackson, Mich.

HORN BRACKETS —Model RR 1221 Twin Rivitor used for riveting flat steel springs to mounting brackets for automobile horns.

MODEL R RIVITOR— Automatically feeds and sets solid steel rivets 1/16" to 1/4" dia. incl. and up to 3/4" incl. long.

31 YEARS EXPERIENCE T-J

TOMKINS-JOHNSON
RIVITORS

Export Market

(*Continued from page* 74)

market amounted to less than $2½ million. Now U. S. machinery manufacturers have taken over most of Germany's pre-war customers, and our exports in this category are expected to exceed $20 million in 1948, as shown in Fig. 2.

In the final analysis, Latin America appears to be entering a minor sort of industrial revolution which will progressively increase the national wealth and international purchasing power of the major countries. While the character of our business with Latin America will gradually change as a result of this economic development, our overall trade with this area will show a healthy increase during the coming years.

Creep Machines

(*Continued from page* 46)

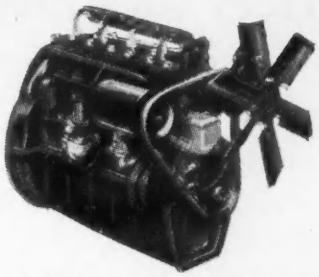
Pure torsion is applied to the specimen S by means of a weight W applied to a pulley P. By using closely spaced supports U at the ends of the specimen, the transverse shear and bending stresses are essentially eliminated. The specimen is gripped between special collets C and the creep angle of twist is measured with the twistometer T. In a test, creep angles of twist readings are recorded at various intervals of time. With the data obtained, angle of twist-time graphs are plotted for each stress and specimen.

Many machine parts in which creep is an important consideration are subjected to fluctuating stresses. It is, therefore, important to obtain creep data for dynamic stress conditions.

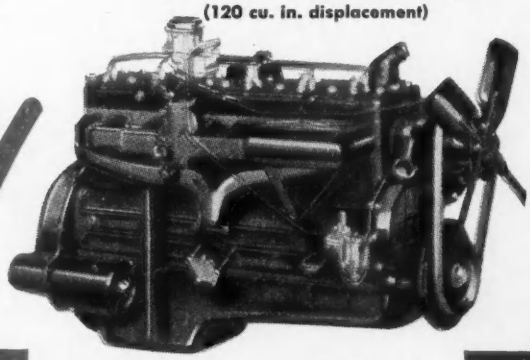
A dynamic tension-creep machine is shown in Fig. 6. The specimen S is subjected to a static tensile load by weights W and to a superimposed fluctuating load by the oscillator O. The oscillator consists essentially of a mechanism which moves two weights vertically (one on each side of the oscillator) over a fixed vertical path. The creep strains are measured with micrometer microscopes M and with the aid of a stroboscope R. Creep-time data can be obtained with this apparatus for various ratios of the static to the dynamic stresses.

A dynamic torsion-static tension creep testing machine is pictured in Fig. 7. The specimen S is subjected to a static tensile stress by dead weights W and to fluctuating torsion by the oscillator O. The axial creep strains are measured by means of the micrometer microscopes M and the stroboscope R. The creep angles of twist are measured by the micrometer microscope M_T. With the data obtained, creep-time curves for both tensile and torsion strains can be plotted.

Here's the New FORD Power-Family



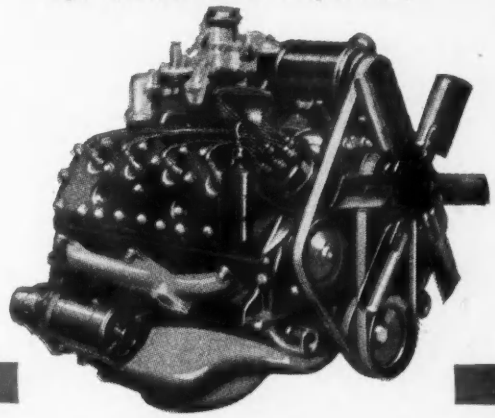
Ford 120 Four Cylinder Industrial Engine
(120 cu. in. displacement)



Ford 226 and 254 Six Cylinder Industrial Engines (226 and 254 cu. in. displacement)

1 "FOUR" . . . 2 "SIXES" . . . 2 "EIGHTS"

Here they are . . . five great, brand-new Industrial Engines built by Ford! Look 'em over—every one the product of Ford experience . . . every one with famous Ford reliability built in . . . every one complete and ready to run! For *new* power, for *right* power, use Ford Industrial Engines, completely new!



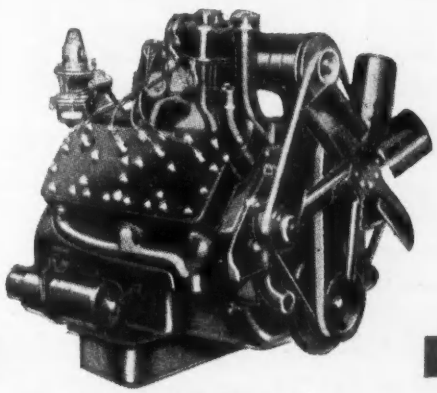
Ford 337 V-8 Industrial Engine
(337 cu. in. displacement)

When It's FORD POWER . . . it's right 3 ways!

RIGHT POWER—A full power range, from the maker that knows power best . . . from Ford!

RIGHT FEATURES—Ford Industrial Engines incorporate the latest advancements of Ford's progressive engineering. You're never outdated when you pick Ford power.

RIGHT SERVICE—Ford Dealers provide complete parts and service facilities around the world. They *keep* Ford power on the job, save you time and money!



Ford 239 V-8 Industrial Engine
(239 cu. in. displacement)

FORD MOTOR COMPANY

INDUSTRIAL AND MARINE ENGINE SALES DEPARTMENT

3510 Schaefer Road • Dearborn, Michigan

Listen to the Ford Theater, Sunday afternoons, NBC Network. See your newspaper for time and station.

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED

Furnaces Save Propeller Costs

(*Continued from page* 42)

employs an electric fan which circulates the electric heat throughout the load. Micromax instruments control and record the entire drawing process which is conducted without a prepared atmosphere.

The heat-treating temperatures and periods for other propeller parts thinner in section than the hub naturally vary, and in the case of smaller parts, a small Vapocarb Hump furnace is used. This furnace is an 11-kw 220-v unit with a maximum temperature of 1850F, and is virtually identical to the previously described 30-kw big Hump furnace. The carburizing gas atmosphere used in this unit may be supplied from the same cracking furnace that supplied the big Hump by an interconnected piping system. If the two furnaces are operated simultaneously, the second cracking furnace may be employed.

A hearth-type furnace completes the complement of furnaces found essential to precise and high-production heat treating of the arc welded and machined parts of the highly stressed propeller hub. The entire group of furnaces has contributed vitally to the success of the arc welding process, which at one time was considered radical for a mechanism subject to such severe vibration and loads as a propeller hub. The magnitude of savings on one propeller hub model are given in Table I.

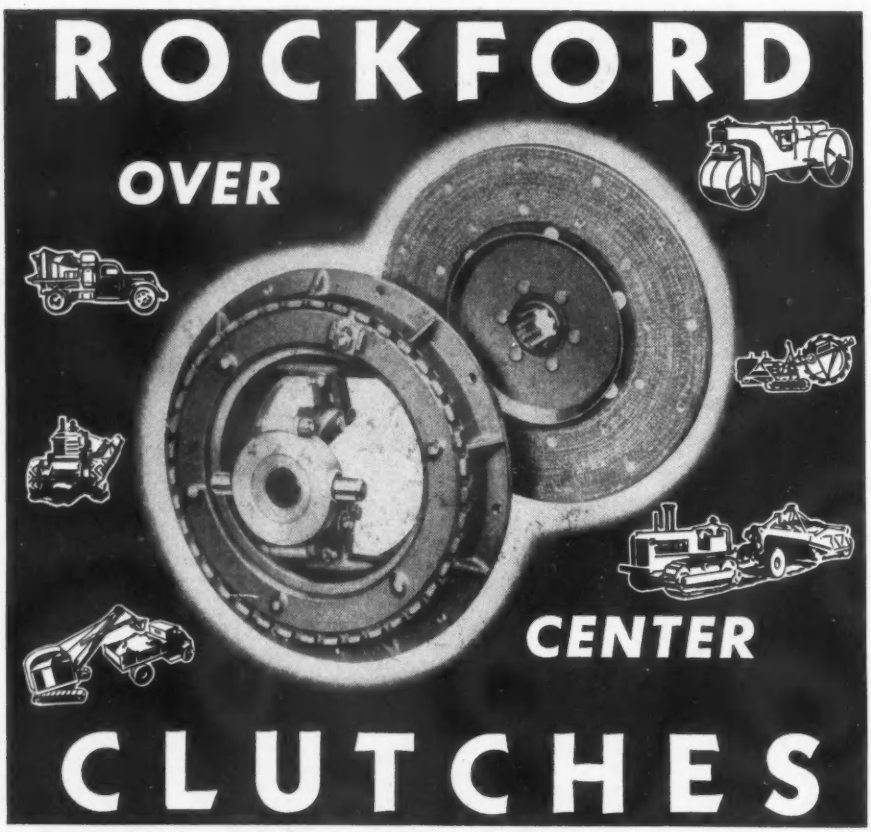
Furnace Brazing

Like the hub, which was once derived from solid stock, blade ferrules were originally machined in one piece from SAE 4130 chrome-molybdenum steel bar, 3⅛ in. in diam. This quality of steel was necessary to get the required hardness of Rockwell C 30-33 on the head portion which is threaded to retain the entire centrifugal load of the blade. In addition, the head is drilled with concentric circles of holes through which lag screws extend into the laminated wood blade to secure it in the ferrule, and, thus, must bear a high localized stress.

To reduce the cost of ferrules, yet maintain their structural integrity, the design of ferrules for all five models of the Aeromatic propeller, ranging from 65-450 hp, was changed to utilize the speed and economy of furnace copper brazing. The change in design consisted of using a separate head machined from SAE 4130 steel and a sleeve of less critical SAE 1015 carbon steel tubing brazed to the head with copper wire, as shown in Fig. 5. The head and sleeve are pressed together with a fit of 0.000-0.004 in. and a piece of 0.062 in. industrially pure copper wire is wrapped around the step made by the mating parts after the assembled parts are thoroughly degreased. The melting point of the wire is 1980F.

A load of approximately 15 ferrules are loaded on a tray and pushed into a 30-kw 110-v Westinghouse hearth-type electric furnace with a maximum temperature of 2100F and a processed gas atmosphere. Loading is shown in Fig. 6. For best brazing results, the entire assembly is brought to a heat above the flow point of the brazing alloy in the shortest time possible in the non-oxidizing atmosphere. The furnace is held at a 2050F temperature which melts the copper wire and, through capillary action, draws it into the pressed joint and forms a slight fillet at the step. Twenty minutes are required for this operation, which is followed by another loading. The second tray pushes the first into a non-heated retort located behind the furnace where the ferrules cool gradually in a hydrogen atmosphere until the brazing copper hardens and the ferrules are below the temperature (approximately 500F) that would cause surface oxidation upon exposure to the air. The clean sur-

(*Turn to page* 82; *please*)



EASY OPERATION
HIGH TORQUE *
POSITIVE ENGAGEMENT
LARGE DRIVING AREA
SMOOTH RUNNING
INFREQUENT ADJUSTMENT
MINIMUM INERTIA

* Equally spaced, hardened and ground roller cams, bearing upon hard steel insets, exert heavy pressure evenly over the entire ROCKFORD Over-Center CLUTCH face — producing unusually high torque, for the clutch size and weight.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

B-W

ROCKFORD CLUTCH DIVISION BORG-WARNER
315 Catherine Street, Rockford, Illinois, U.S.A.

An Old Bus Gets 1,000 Miles per Quart of Oil from Pedricks

From the operator of a New Zealand motor coach line comes this story of a 32-passenger bus which, with 56,000 miles on the speedometer, had a prodigious thirst for oil.

Two different sets of replacement rings had been installed, without controlling oil consumption. The operator had just about decided to have the engine rebored. He determined, however, to try one more set of rings . . . and chose an Engineered Set of Pedrick "Heat-Shaped" piston rings.

Results were so good that he took the trouble to send us his thanks, half way 'round the world. To quote from his letter: "The bus has done 16,000 miles [since Pedrick rings were installed] and now is using only a quart of oil per 1,000 miles. She has never run better in all the time we have had her."

Wherever piston rings are used, Pedrick "Heat-Shaped" rings save oil, save fuel, reduce maintenance costs, and maintain peak efficiency longer. WILKENING MANUFACTURING CO., Philadelphia 42, Pa. *In Canada:* Wilkening Manufacturing Co. (Canada) Ltd., Toronto.

Pedrick

"HEAT-SHAPED" PISTON RINGS

For 28 Years, Supplier of Piston Rings to Leading Vehicle and Engine Manufacturers

Furnaces Save Propeller Costs

(*Continued from page* 80)

face of the brazed ferrule (see Fig. 5) is due to the combusted gas of the furnace which is rich in hydrogen, nitrogen, and carbon monoxide.

As shown in Table II, the change to furnace brazing reflects a substantial saving of 24.7 per cent. The cost saving with the ferrule is particularly important since two each are made for every hub and one each for spare and repair blades. At 1947 scheduled production, the gross annual savings of this process is approximately $16,000.

Oven Processed Blades

The most recent change in manufacture of Aeromatic propeller components has been due to the advantages obtained through the use of an electric oven in the process of plastic covering propeller blades. In this unique process, the Aeroloid plastic sheeting applied to the blade consists of two pieces, one lapped and cemented over the edges of the other where they met after enveloping the blade. The length of the lap, the labor of smoothing the plastic, and the occurrence of porosity at the lap all dictated the necessity for an improved process. Considerable research determined that superior adhesion of the plastic sheet and a substantial labor saving was possible if the plastic was applied in a single piece to make an envelope over a heated blade. As the blade cooled, a partial vacuum formed in the envelope, drawing it tightly to the blade and advancing the curing cycle of the plastic cement and the plastic sheet.

All Aeromatic blades are carved from laminated maple blanks in high-speed automatic profiling machines. The blade blocks are composed of veneers, splayed alternately 15 deg to the block centerline to provide strength, and bonded with a thermal-setting synthetic resin. Moderate platen pressure and high-frequency radio heat sets the bond permanently. The resulting wood composition is so tough that metal cutting tools are used almost exclusively in bringing a blade to shape and template accuracy. The spiral milling cutter type knives of the profiling machine turn at 9000 rpm, producing a smooth blade surface within 0.010 in. of the design dimensions. Sanding machines and templates are used in the final finishing. Ferrules, of the type previously described as being copper brazed, are fitted to the finished blade shank, lag screw holes drilled, and lag screws driven into the blade through the head of the ferrule. Following this work the blade is ready for plastic processing.

A cement composed of 7 per cent cellulose nitrate, by weight, and 93 per cent acetone is applied to the entire blade surface. The blade is then placed in the 30-kw 440-v Gehnrich electric oven, shown in Fig. 7, and held there for 45 min at 180F. This length of time may be increased for large blades, but in no case is more than 90 min required to thoroughly heat the blade. On production runs of the same model blades, a dolly carrying as many as 60 blades may be loaded at once. Normally, however, smaller quantities of mixed model blades are put through the heating cycle.

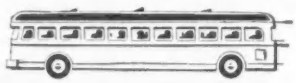
A hard cellulose nitrate sheet, 40 in. by 18½ in., is softened for application to the blade by suspension in a softening solution of two parts of water to one part of acetone having a specific gravity of 0.955 at 95F. The softening tank solution is maintained at a constant temperature by a thermostatically controlled electric heater. After 45 to 60 min in the softening solution, the nitrate sheet is pliable yet still tough enough to resist undue stretching or tearing. Wiped dry, the sheet is ready for application to the blade.

(*Turn to page* 85; *please*)

If you manufacture...

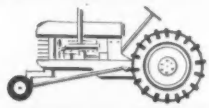
Automobiles

Trucks and Trailers



Busses and Trackless Trolleys

Industrial Electric Trucks



Tractors

Aircraft

You can save 3 WAYS with...

Essex "Packaged" Wiring Harness

1. ENGINEERING
2. FIRST COST
3. INSTALLATION

Scores of manufacturers have found that they save *time, trouble and money* by turning their electrical wiring harness problems over to Essex specialists.

Essex *One-Source* service handles the intricate job of producing lighting, ignition and control harness assemblies *custom-built* to your exact specifications and *complete* with all manual and electrical control devices for quick, efficient installation.

Through intensive specialization in wiring harness assemblies, Essex has developed line production methods of manufacturing, assembly and inspection, for the economical production of high grade, individually tested, specially engineered assemblies.

Investigate Essex "One-Source" service today!

WIRE SX PRODUCTS

ESSEX WIRE CORPORATION

WIRE ASSEMBLY AND CORD SET DIVISION
SALES DEPARTMENT

MONTICELLO, INDIANA

Sales Offices: Chicago, Ill.; Cleveland, Ohio; Dayton, Ohio; Detroit, Mich.; Kansas City, Mo.; Los Angeles, Calif.; Milwaukee, Wis.; Newark, N. J.; Philadelphia, Pa.; San Francisco, Calif.; St. Louis, Mo.

Propeller Costs

(*Continued from page* 82)

Immediately upon removal of a blade from the oven, it is covered on one side with a coat of plastic cement. Cement is also applied to half of the softened sheet. A blade in the arbor of the doping bench and the softened sheet, before doping, are shown in Fig. 8. The two pieces, doped with cement, are joined, and the plastic sheet is rolled its entire length toward the tip of the blade to remove wrinkles and air pockets. An overlap of one in. of plastic is left for joining later. The blade is then turned over and another coat of cement applied to plastic and blade. The overhanging sheet is trimmed and scalloped at the tip to avoid wrinkling when making the lap joint. The lap joint is given a generous amount of cement and firmly rolled to secure a bond. Setting of the cement starts quickly so the whole envelopin process is conducted without pause.

Air bubbles often present with the old process are non-existent with the heated blade. As soon as the envelope is airtight, the cooling blade commences the action of drawing the plastic to a secure bond. The curing time of the plastic has been reduced from 24 hr to less than 18 hr, and porosity at the lap joint is no longer present. The time and cost data given in Table III illustrate the savings per unit made possible by the inclusion of the oven in the blade covering process, but the data does not show the basic improvement in the adhesion of the covering and its aerodynamically smoother surface. For the relatively short period of time the blade heating process and Gehnrich oven have been in operation, the savings approximate $7000.

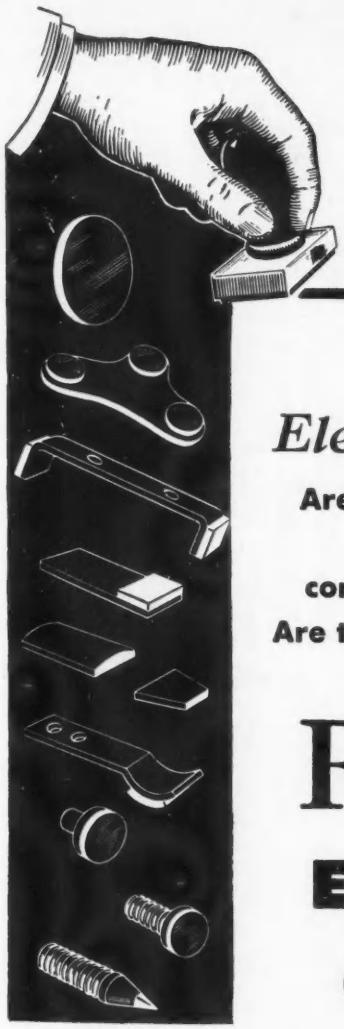
Heavy Duty Trucks

(*Continued from page* 37)

to synchronize and control the scheduling and movement of all major conveyor lines in this plant.

What is considered to be an innovation in conveyor design is found in the installation of a new automatic dip conveyor line in the paint shop. This is intended for the automatic black enamel dip of miscellaneous parts. Its novelty lies in the adoption of a cable type conveyor instead of the chain conveyors which are employed so extensively. The cable

(*Turn to page* 86; *please*)



Hold it, Mister!
before you "OK"

How about Electrical Contacts?

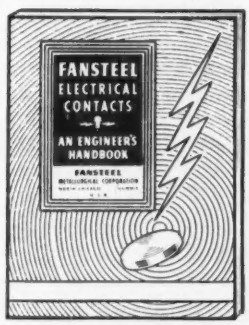
Are they of the right material?
Are they of correct size, shape and style?
Are they economical to assemble?

•

Fansteel
ELECTRICAL CONTACTS

Before you put the final "OK" on designs and specifications, it may pay you well to consult with Fansteel. A joint study of your product by yourself and a Fansteel engineer may reveal a less costly contact material, a simplification in style or assembly which may lead to substantial savings for you.

Even if your electrical contacts appear completely satisfactory, you may benefit greatly by keeping in touch with Fansteel's recent new developments in materials, designs and assemblies. Fansteel Metallurgical Corporation, North Chicago, Illinois.



Send for the 32-page Fansteel Engineer's Handbook —no charge

Fansteel
ELECTRICAL CONTACTS
and CONTACT ASSEMBLIES

Heavy Duty Trucks

(*Continued from page* 85)

used for this purpose is a length of ½-in. flexible steel stranded cable, arranged with two dips—one to facilitate loading, the other for dipping into the enamel tank. This is perhaps one of the first installations of its kind in the automotive industries, according to the Federal management.

It may be of interest to comment on the Newcomb-Detroit drying ovens installed in the cab and sheet metal lines. Of recent origin, they employ the Burdette infra-red principle gas burners. Each of the ovens is fitted with a multiplicity of small gas burners housed in circular refractory elements, said to provide a unique combination of radiant heat as well as convection. Convected heat is transmitted by the circulating fresh air stream which continually exhausts the products of combustion as well as other gases. The refractories, heated to about 2300 F, exert sufficient effect in heating the sheet metal directly to hold the sheet metal at a temperature about 25 F higher than the ambient atmosphere.

The important feature of this type of furnace is that drying time is shorter than in conventional ovens, thus not only speeding the cycle of operations on a continuous conveyor but quite effective in reducing the length of the oven. This is of vital importance in most plants where floor space is at a premium with the constant need for expanded facilities. These ovens are subject to close control of temperature, this being effected through the application of thermostatic control devices designed to vary the volume of gas to the burners.

FAIRFIELD for FINE GEARS

• *The modern Fairfield plant at Lafayette, Indiana, houses some of the finest gear production facilities in existence.*

IF you use gears in the product you make, we believe it will pay you, as it has many others, to become acquainted with FAIRFIELD—the place where fine gears are produced to meet your specifications EFFICIENTLY, ECONOMICALLY! Fairfield's production facilities are unexcelled for making all kinds of high precision, automotive type gears such as are now finding wide application in all branches of industry: for machine tools . . . for agricultural implements . . . for construction machinery . . . for printing presses. No matter how special your requirements may be, Fairfield has the equipment and the "know how" to meet virtually any need.

TYPICAL PRODUCTS
FOR WHICH
FAIRFIELD FURNISHES GEARS

TRACTORS • TRUCKS
OUTBOARD MOTORS
DIESEL ENGINES
ROAD GRADERS
MACHINE TOOLS
POWER SHOVELS
COMBINE HARVESTERS
WINCHES

FAIRFIELD
MANUFACTURING COMPANY
319 S. Earl Avenue • Lafayette, Indiana

Torsion Rod

(*Continued from page* 32)

purposely out of alignment with the cranks, if installation clearance requirements so demand.

Since driving and braking reactions are taken by the suspension linkage, the spring rods are not subjected to any loads except torsional twist. Consequently, the quality of the ride remains the same throughout the life of the vehicle. Because they are free of external influences such as corrosion and grooving, rod springs have exceptional service life, often exceeding half a million miles. The positive action of the suspension in the vertical and lateral directions assures greater stability in the steering mechanism. Axle roll is eliminated and caster settings remain unaffected by conditions of load or spring deflections.

The rods can be preset during manufacture if desired, but this type of treatment has not been adopted for the application described here. Presetting, which consists of twisting the rod beyond its range of service loading, would minimize settling in service and would increase the yield strength due to work hardening. Settling is not a problem in this case, however, for the maximum stress as permitted by the movement of the linkage is held to a reasonable value of 85,000 psi. Compared to the high strength value of the heat treated alloy steel bar, this stress which is produced by a 90 deg twist is very nominal. The average stress in service is approximately 50,000 psi because the crank lever is near the horizontal or half twist position most of the time.

Spring rods with flattened ends can be manufactured quite easily with uniform stress distribution. Grinding of the surfaces adjacent to the upset ends further reduces stress variations and eliminates the need for pre-setting as a requisite to good service life. Presetting would require opposite hand twists of the rods for the opposing sides of the vehicle and therefore would complicate procurement and installation as well as maintenance.

Quick Delivery

JOHNSON BRONZE

Ledaloyl SELF LUBRICATING BRONZE

POWDER METALLURGY

● *Here is Good News* for manufacturers of all types of equipment. Now you can secure LEDALOYL bearings, bushings and parts . . . particularly in the smaller sizes . . . in *days* . . . not months. Our new and enlarged facilities . . . plus new equipment . . . plus new methods have made this prompt delivery possible.

Good delivery is but one of many reasons for specifying LEDALOYL. This new and unusual bearing material combines all of the best features of powder metallurgy. Our exclusive process of *pre-alloying* the basic materials . . . casting copper, tin and lead into a high quality bearing bronze alloy *prior* to manufacturing . . . provides a uniform structure with uniform strength and uniform porosity. Thus, the self-lubricating action is both constant and dependable.

LEDALOYL is low in cost. This is particularly true when there is quantity of a size. Each bearing, bushing or part is molded, under pressure, to required size and shape. This eliminates all expensive machining operations. Why not check over your needs today? Give us the opportunity to show you how to save both time and money. There's a Johnson Bronze office as near as your telephone.

JOHNSON BRONZE

SLEEVE BEARING HEADQUARTERS

The MOST COMPLETE SLEEVE BEARING SERVICE in the WORLD

625 S. MILL STREET NEW CASTLE, PA.

Helping Europe

(*Continued from page* 33)

as against an expected 100,000 tons in 1948, including ERP. In the case of finished steel, the comparison is 348,000 tons per quarter in 1947 as against an estimated 380,000 tons per quarter in 1948.

The additional iron and steel supply which will go into manufacture of ERP industrial machinery and equipment and agricultural equipment presents a somewhat different picture. About 1.25 million tons of finished steel is expected to be required for this purpose; more pessimistic private estimates place it at a still higher figure. The total impact of steel requirements on the domestic supply may mean as much as 3.6 or 3.7 million tons lost to durable goods manufacturers of the United States.

In effect, the final result is that the additional steel (over last year's exports) required for ERP plus the amount of production lost as a result of the coal strike just about balances the extra 1948 production expected from steel plant expansion.

The present estimates do not provide for shipments of scrap, tin or aluminum from the United States. However, they do estimate shipments from the United States of 58,000 tons of copper, 22,000 tons of lead, 44,000 tons of zinc, and $95 million worth of electrical equipment during the fiscal year ending June 30, 1949.

Save Money... Reduce Assembly Time

MULTIPLE BREAKER INSTALLATIONS IN MANY COMBINATIONS NOW POSSIBLE

The dimples in the mount and circuit breaker case shown in the magnified view give the snap-action. Circuit breakers snap into the mount securely and quickly, by *finger pressure.* No spot welding. No screws. No tools needed. *And,* if desired, the mount can be attached to the car body . . . the circuit breakers assembled on the wiring harness, and snapped into the mount when the car is wired. Write for further information, or phone our Detroit office, 6432 Cass Avenue, Detroit 2, Michigan, Phone Madison 6300.

FASCO
CIRCUIT BREAKERS

Safeguard Operation of Automotive Electrical Equipment Instantly . . . Automatically . . . from Dangerous Overloads or Short Circuits.

©1948

F. A. SMITH MANUFACTURING CO., INC., ROCHESTER 2, N. Y.

Electrical Engineering and Manufacturing Serving the Automotive Field Since 1922

Dynaflow

(*Continued from page* 28)

broaching, making two pieces from each blank. The set-up includes two surface broaching operations. The first step, on a No. 10-66 Cincinnati Duplex Hydro-Broach, is to broach a slot on one end, broach a radius on one side with one ram, then repeat the same operations for the other side with the second ram. The work then goes to a No. 3-48 Cincinnati Duplex Hydro-Broach where one ram broaches a radius and 3/16 in. step, on one side, and repeats these operations on the other side; while the second ram broaches a radius and cuts the two pieces apart.

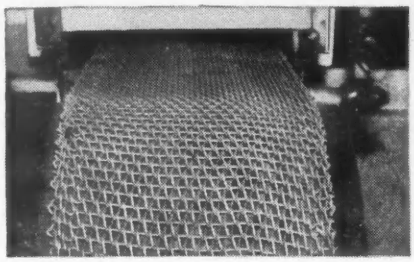
The parts go to a Thompson Type B hydraulic True-Form grinder for finish grinding the crown; are burred in a Roto-Finish wet tumble barrel, and are washed in preparation for hardening. This is done in a 15-KW Tocco induction heating machine fitted with an oil quenching tank.

The converted reaction shaft assembly is really a large part, consisting of the aluminum die-cast reaction flange, previously machined, to which is pressed the reaction shaft, the operation being done in an American vertical hydraulic press. After drilling and reaming the dowel holes, the assembly goes to a No. 47-A Heald Bore-Matic for finish-turning and chamfering, rough-turning, facing and chamfering the pilot, facing the adjacent side, and forming the grooves.

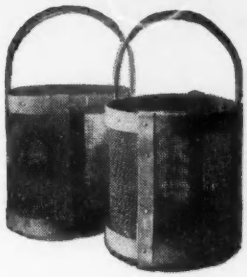
Next in line are two big special Barnesdril machines, one for drilling, the other for tapping. A four-way Barnesdril unit drills 19 holes with the right hand horizontal head; 18 holes with the left hand horizontal head; six holes with the vertical head; and one hole with an angular head. A three-way Barnesdril machine taps six holes with a vertical head; five holes with a horizontal head; and one hole with an angular head.

The planet rear carrier is another of the major parts. It is made from a large steel forging and requires a sequence of some 170 operations. Following initial machining in a special Buhr two-way horizontal machine, these parts are turned and faced in two Fay automatic lathes. These machines are fitted with solid cement-

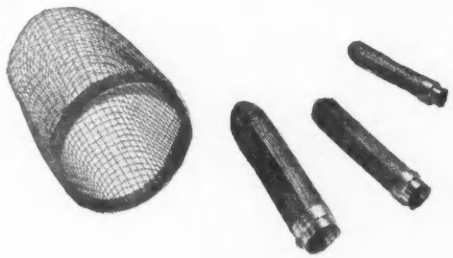
(*Turn to page* 91, *please*)



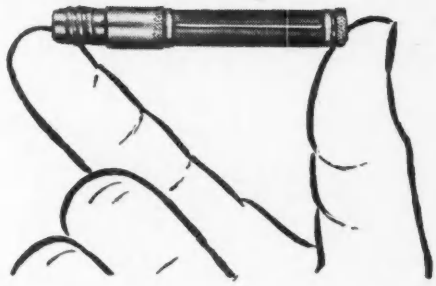
HIGH TEMPERATURES *up to 2040° F. didn't ruin this Inconel furnace conveyor belt even after 8640 hours of use.*



CORROSION RESISTANCE *to hot pickling acid makes Monel screen a favorite material for dipping baskets.*



EASY FORMING *characterizes wire cloth of Monel, Nickel or Inconel. Any practical shape or size can be fabricated and joined by brazing, soldering or welding.*



PURITY PROTECTION *is assured by the use of tiny Monel filters when blood plasma is administered.*

What properties do you need in Screen and Filter Cloth?

Filter and screen elements need not be trouble spots in your equipment!

And they won't . . . if they're made of Monel*, Nickel or Inconel* wire cloth.

For these are the "task metals" of industry.

Compare their properties with any fabric or metal cloth now causing you trouble. They're rustless . . . corrosion-resisting . . . strong . . . tough. They endure abrasive wear. They withstand extremes of temperature. They do not contaminate the material being handled.

Many equipment manufacturers already have standardized on elements of Monel, Nickel or Inconel wire cloth. Maybe your manufacturer is one of them. But maybe he isn't. So speak to him. Let him know that you want the extra protection of the "task metals" wherever filters, strainers or screens are used.

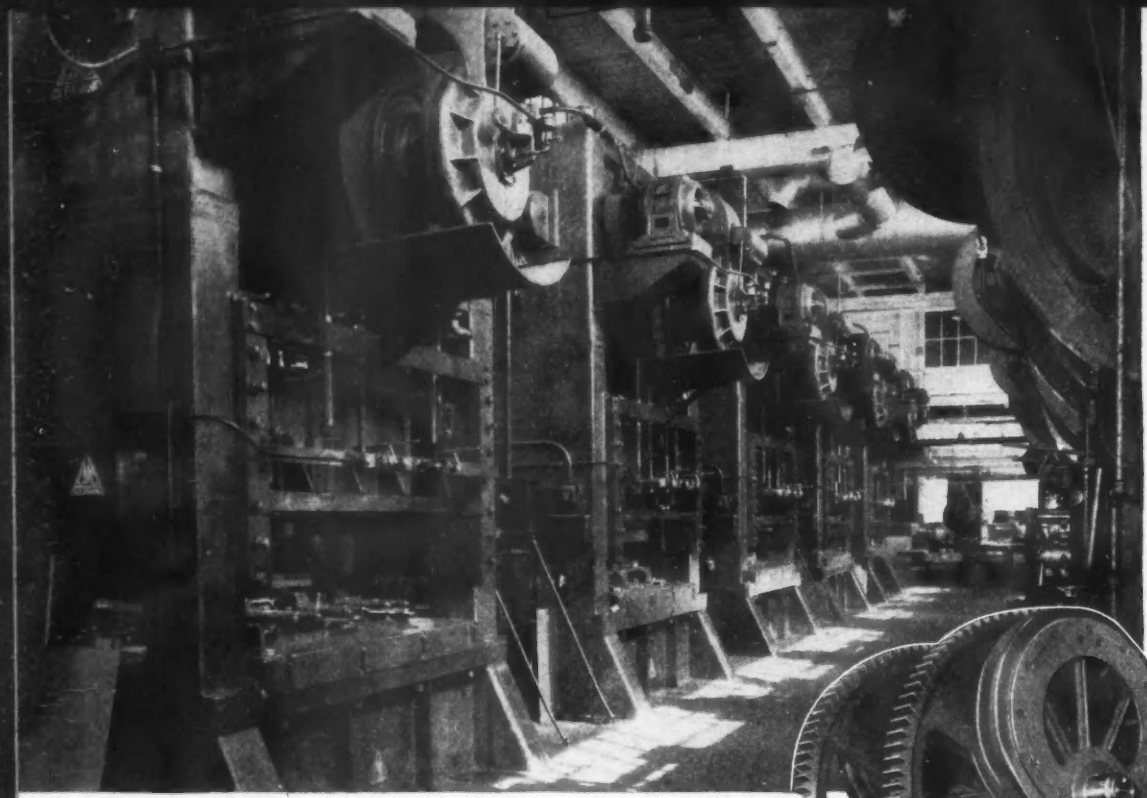
We have a booklet, "ESTABLISHED WEAVERS OF WIRE CLOTH." *It lists weavers; shows different types of cloth available; shows how maintenance costs can be cut by wire cloth of Monel, Nickel or Inconel. Write to Mr. F. R. Bailey of* INCO *for your copy.*

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

*Reg. U. S. Pat. Off.

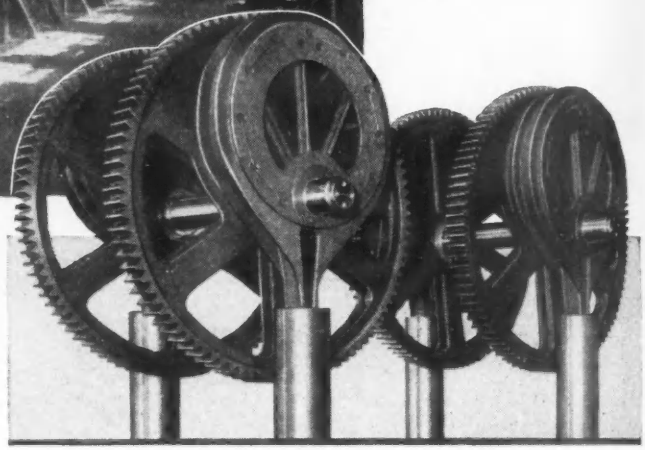
EMBLEM OF SERVICE
INCO
TRADE MARK

Monel Nickel Inconel*
"Task Metals" for Industry



CLEARING

MECHANICAL & HYDRAULI



Inset: Accurate movement in multiple-point Clearing presses is assured by careful design and manufacture. Gears are steel, heat treated, machine cut from solid. Large gears have "H" spokes for strength with minimum inertia factor.

GET ALL THE BENEFITS OF PRESS METHODS

Substantial savings by substitution of stampings for castings or forgings are no longer news to informed production men. The ease with which that saving can be made often minimizes the attention given to the press itself, and thus prevents attainment of maximum production economy. For example, Clearing crankless presses of multiple suspension types can actually save their entire cost over a period of years simply by giving longer life to dies, reducing rejects, and speeding later assembly operations through close-tolerance performance. This is no dream—there are cold, hard facts and figures ready for your inspection. And if your particular problem doesn't call for that sort of equipment, there are other facts and figures dealing with other types of Clearing presses which will apply to your case.

Production by press methods is the economical way. But don't be satisfied with that alone. Get maximum economy while you're at it. Ask us to show you.

CLEARING MACHINE CORPORATION • 6499 W. 65th St., Chicago 38, Ill.

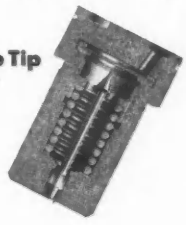
CLEARING THE WAY TO EFFICIENT MASS PRODUCTION

SAVE UP TO 25%
on DIESEL FUEL INJECTION NOZZLES and HOLDERS

. . . by specifying
EX-CELL-O

It's true. You can cut engine costs and eliminate field service problems . . . simply by specifying EX-CELL-O Diesel Fuel Injection Nozzles and Holders. They are outwardly opening, differential type pintle nozzles designed to give you maximum efficiency from high speed Diesel engines of 5 to 300 H.P. Installation? Simple. No drain lines required, no adjustments necessary. Each unit self-contained, factory calibrated and sealed. Cost? *Approximately 25% less than any other nozzle on the market!*

Replaceable Nozzle Tip
Cross-sectional view shows simplicity of design. Only 3 working parts.



Write today for this booklet containing complete information.

Fuel Injection Division
EX-CELL-O CORPORATION
1200 Oakman Blvd. · Detroit 6, Mich.

Dynaflow

(*Continued from page* 88)

ed-carbide tool bits. The part is rough-ground in a Landis cylindrical grinder and then goes to an interesting five-way Natco drilling machine having a six-station fixture arranged for loading and unloading at the first station. Each of the remaining five stations has a three-spindle fixed center drill head, the operations being as follows: drill three bolt holes, drill three small shaft holes, drill three pinion pockets, drill three large shaft holes. These holes are finish-reamed in another multiple-spindle Natco. Another important step in machining this part is the finish boring of the pinion shaft holes in an Ex-Cell-O. These bores are held to plus or minus 0.0002 in. for spacing.

Later in the sequence the part is subject to a series of grinding operations in a Landis "CH" grinder, a Norton "C" grinder, and a Cincinnati Hydraulic grinder. Final operations include the finish-facing of pinion pockets to depth in a 47-A Heald Bore-Matic; followed by finish-facing of the bottom of the sun gear hole and precision-boring of the pilot bearing hole in an Ex-Cell-O single end precision boring machine.

The remaining part considered in this study is the low range reaction gear. It is discussed primarily to emphasize another of the surface broaching operations of uncommon interest. The major initial stages for producing the blank are handled in two 8-in., 8-spindle Type D Bullard Mult-Au-Matics, the first for roughing, the second for finishing operations. An important feature of the tooling is the use of solid cemented-carbide tools. The center bore is ground in a No. 112-AH Bryant O single-end precision-boring machine. The I.D. faces are ground in a Bryant internal grinder while the gear end face is finished in a Heald rotary surface grinder. The O.D. is ground in a Cincinnati cylindrical grinder and this, in turn, is followed by milling three slots in a Sundstrand hydraulic mill.

An important feature of this part is a group of nine equally spaced slots in the periphery of the drum. The production problem in this case is to cut these slots in the relatively large diameter, thin-walled drum without causing distortion. The operation is performed in a No. 3-48 Cincinnati single ram, vertical Hydro-Broach with a broaching tool arranged to cut three slots at a time. For this purpose the part is placed in a chuck and then fitted with an internal expander, the function of which is to hold the rim securely against the pressure of the broaching cut. The fixture is designed to index the work three times to produce the nine slots.

WATER SYSTEMS FOR THE LARGEST
Chemical PLANTS

ALMOST all of the Nation's largest and finest chemical plants own and use Layne Well Water Systems exclusively. It is in the Layne Systems that the most critical engineers and operational superintendents have found: 1.—definitely outstanding efficiency; 2.—extraordinarily fine and long lasting quality, and 3.—dependability in years and years of constant peak load operation.

But chemical plants are not alone in such preference. Check the hundreds of cities, railroads, packing houses, tire manufacturers, steel mills, petroleum refineries, army camps, naval stations, big air conditioning and irrigation projects—in fact almost every big well water user in the United States, Canada and Mexico. There too, you will find almost exclusive use of the world famous Layne Well Water Systems. Such uncontested leadership is ample proof of superiority. For literature, address Layne & Bowler, Inc. General Offices, Memphis 8, Tennessee.

LAYNE
WELL WATER Systems

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Pacific, Inc., Seattle, Wash. ★ Layne-Texas Co., Houston, Texas ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Western Co. of Minn., Minneapolis, Minn. ★ International Water Supply Ltd., London, Ont., Can. ★ Layne-Hispano Americana, S. A., Mexico, D. F.

Observations

Transfer Machines

JUDGING BY OUR OBSERVATIONS DURing the past year it is a foregone conclusion that the transfer type machine has gained industry-wide acceptance and will dominate the machine shop scene from now on. Newest entry in this field is Kearney & Trecker, one of the major producers of milling machines, with an enormous shuttle type transfer milling machine installed at Lincoln for milling the big V-8 engine block.

Steam Power

FOLLOWING ON THE HEELS OF RECENT discussions of steam power plants for trucks and buses is the entry of a front drive, steam-powered car in the Indianapolis Race by Don Suttle of Detroit. The Suttle engine is of two-cylinder, double-acting uniflow type, full condensing in a closed system containing three condensers. Assuming the unique mechanical features of this engine can stand the test of the brick track, theoretically at least, the uniflow engine should be capable of maximum thermodynamic efficiency. The backers of this venture are taking a good gambling risk. The stakes may be high if this car makes a good showing.

HAVE YOUR

Products

HAD A SPRING CHECK-UP?

Have you analyzed the spring cost requirements for your products lately? In many cases, manufacturers find that they are wasting money—unnecessarily increasing the unit cost of their products—by using "luxury" springs.

It may not be essential, for example, to use springs with such close tolerances. Your specifications may unnecessarily call for ground-end springs—or fancy hooks that could be eliminated.

Why not have a Lewis Spring Engineer help you with spring specifications? Lewis engineers are thoroughly experienced in all phases of spring design and applicability to products. They can quickly recommend the most practical and economical spring or wireform for your particular requirements.

Now, with prices of component parts as they are, you'll find welcome relief in this opportunity to lower your costs without lowering product quality.

Lewis engineers have saved manufacturers thousands of dollars. There is a Lewis Spring Engineer near you who will be glad to work with you in deciding the most practical springs or wireforms for your products. Get *your* spring check-up now. There's no obligation.

LEWIS SPRING & MANUFACTURING COMPANY
2644 WEST NORTH AVENUE CHICAGO 47, ILLINOIS

Electrostatic Spray Painting

UP TO NOW PRODUCTION APPLICAtions of the Ransburg electrostatic paint spraying technique have been confined to small parts such as shock absorbers. Now its potentialities have been widened considerably by the adoption of the technique by Norge for painting refrigerator cabinets and doors. Production costs are said to be reduced in almost amazing fashion. For one thing the entire operation is handled in a single pass through a single booth, replacing six hand spray operators. According to G. P. Kennedy, resident manager of the Norge plant, the company expects to save well over $100,000 per year in paint and labor alone. Moreover, productivity is increased 45 per cent with less floor space than before. Since the spray booth remains clean considering the volume of work being handled, the overall economy also includes worthwhile savings in maintenance.

Automatic Shifting

THE PATTERN OF AUTOMATIC TRANSmissions became more clear with a recent announcement by Borg-Warner. It appears evident that this company has finally reached the stage where it is ready to offer perhaps three different types of automatic transmissions for study by its customers. None of these is in production, however, and no plans have been made for manufacturing until actual production orders have been placed. At General Motors the thinking has veered to the torque converter for which ground was broken by Buick's Dynaflow. It now seems not unlikely that the torque converter will dominate the GM scene in the future. At the same time Borg-Warner is continuing development of semi-automatic transmissions on the theory that some of lower priced cars may want an interim design less expensive than full automatic.

Light Cars

HENRY FORD II LIFTED THE CURTAIN that concealed the light car program about a year or so ago. The Ford light car, originally groomed for the domestic market, is the new advanced car to be announced by the Ford organization in France. However, it will use an improved version of the prewar 60 hp. V-8 with a rating of 66 hp., instead of a new powerplant contemplated for consumption in the USA. When you see this car described in Automotive Industries late this year, that will reveal the story.

LOOK OUT!

wash your windshield while you drive

A single touch of the button squirts water continuously for 16 seconds in the path of the wiper blades... to wash the windshield clean. Vacuum operated. Nothing to pump.

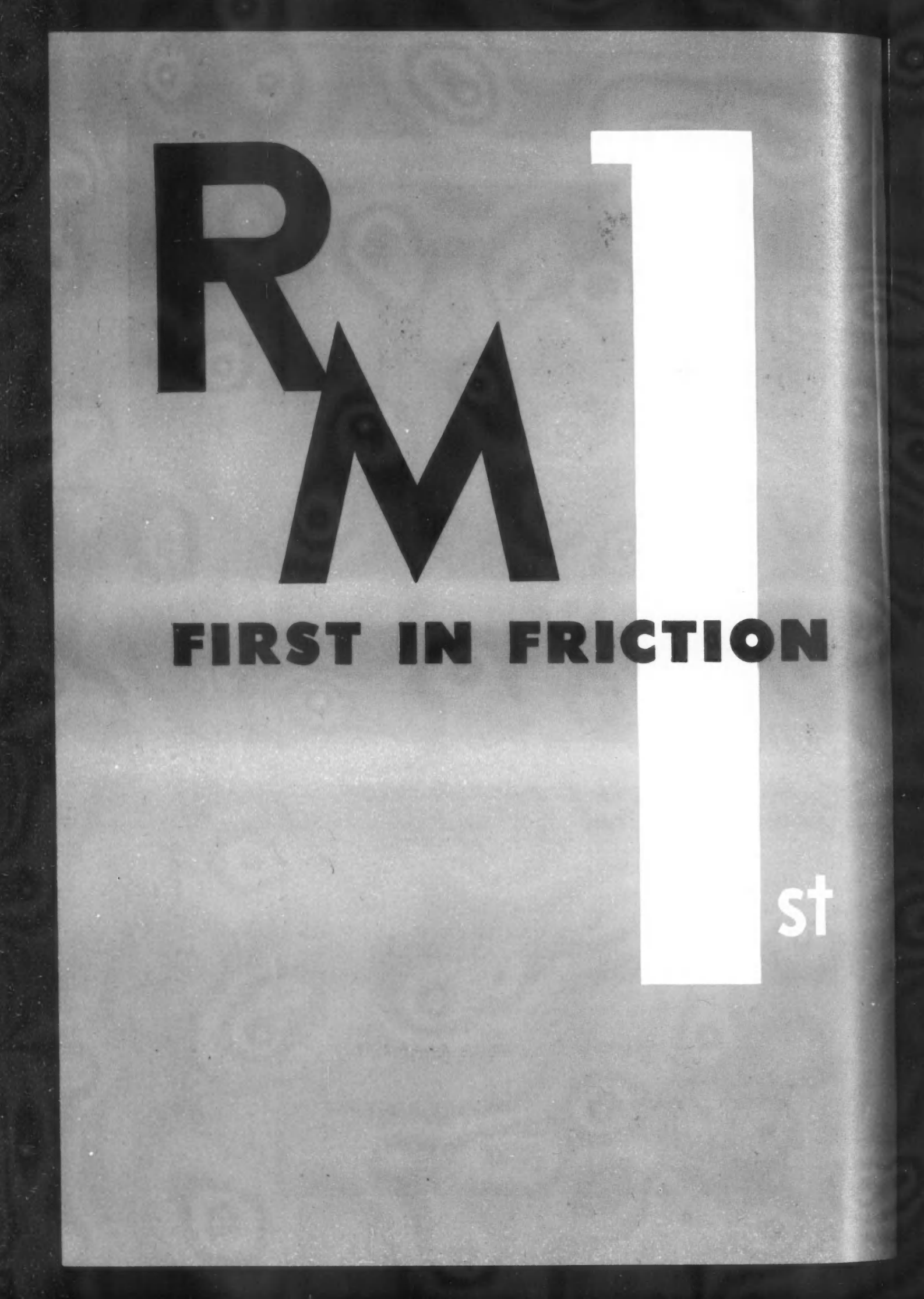
● In moments of crisis a *clear* windshield is as vital as good brakes.

With Trico's "Two Little Squirts" a touch of the button washes off dirty mist, muddy roadsplash or dazzling dust. Drivers can have clear vision *always*...every bad-weather mile.

Nearly *two million* Trico Washers are now in use. Buick, Cadillac, Lincoln, Oldsmobile and Pontiac are gratifying an ever-increasing public demand by making factory installations. Other important makes are piping new production for easy installation by dealers. Trico Products Corporation, Buffalo 3, N. Y.

TRICO *Automatic Windshield Washers*

Nothing to Pump · Vacuum Operated


RM
FIRST IN FRICTION
1st

First in Development!

As the developer of the industry's first asbestos friction materials, R/M has always set the pace. Working hand in hand with automotive engineers, R/M has anticipated the friction material requirements of each new advance in brake and clutch design . . . and has engineered the materials in advance of the need. Basically, the history of automotive friction materials is the history of Raybestos-Manhattan. This record of R/M "firsts" tells the story:

Woven Brake Lining
Asbestos Brake Lining
Ground Wearing Surface
Zinc Alloy Wire Brake Lining
Pre-Treated Yarns
Extruded Pulp Brake Lining
Flexible Pulp Brake Lining in Rolls
Dry Process Brake Lining
Semi-Metallic Brake Lining
Bonded-to-Metal Brake Lining

Woven Clutch Facings
Molded Clutch Facings
Molded Asbestos Clutch Facings for Clutches Running Immersed in Oil
Extruded Clutch Facings
Endless Woven Type
Pre-Treated Clutch Facings
Gear Toothed Clutch Facings
Semi-Metallic Clutch Facings
Bonded-to-Metal Clutch Facings

First in Continuing Research!

R/M research never ceases. Today, new materials are being developed, tested, and produced to meet changing needs such as equalizing wear, giving smoother performance, minimizing noise, and eliminating fade and heat checking.

First in Production Capacity!

Behind the R/M engineer who calls on you are the production capacity of four large plants, the research and testing facilities of four complete laboratories, the experience of four fully-staffed research departments. All work together to get you the best results in the shortest possible time.

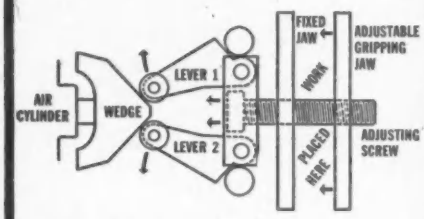
Whatever your problem . . . in friction materials or in automotive rubber products . . . you're safe to entrust it to the company that has been first in so many improvements. To get the benefit of this experience, consult your R/M field engineer, or write direct to headquarters. Please make your inquiry as specific as possible.

RAYBESTOS-MANHATTAN, INC.
EQUIPMENT SALES DIVISION
620 FISHER BUILDING, DETROIT, MICHIGAN
Factories: Bridgeport, Conn. • Manheim, Pa. • Passaic, N. J. • N. Charleston, S. C.

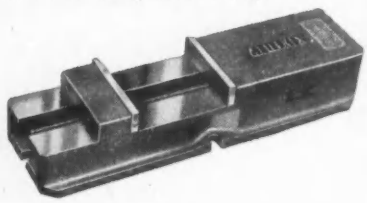
The AIRLOX guts

THE GUTS

This diagram of the patented Senior AIRLOX linkage shows the wedge and lever utilizing total cylinder drive.



The wedge, driven by the air cylinder, forces the levers apart on their fulcrums to pull the gripping jaw toward the work and fixed jaw. Adjusting gripping jaw and stroke permits locating work with assured operator safety.



THE S-13 PNEUMATIC VISE

The AIRLOX Model S-13's quick power stroke speeds production.

For most machine and bench work. Timing of jaw movements with machine used provides automatic operation. B. & S. jaw hole spacing, or your own, allows using your present jigs and fixtures. Enclosed against chips and cutting oils. Carefully ground jaw faces. Special alloy construction. Accurately flanged and keywayed. *Hydraulic drive optional.*

SPECIFICATIONS

Overall: 5¼ x 8⅜ x 29 in. Weight: 130 lb. Stroke: 1/16 to 1/2 in. Jaw-face size: 7 x 1¾ in. Maximum space between jaws: 12 in. Gripping force: air-line pressure times 90. *Increased pressure optional.*

Write for data sheet S-13.

production devices, inc.
Whitehall, New York

AIRLOX: The complete line of pneumatic and hydraulic vises

Business in Brief

Written by the Guarantee Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

Renewed advances in general business activity are indicated. The *New York Times* index for the week ended April 17 stands at 143.6, as against 142.6 for the preceding week and 144.2 a year ago.

Sales of department stores during the week ended April 17, as reported by the Federal Reserve Board, equaled 294 per cent of the 1935-39 average, as compared with 298 in the week before. Sales were eight per cent above the corresponding distribution a year earlier, as against a preceding similar excess of 13 per cent. The total in 1948 so far reported is six per cent greater than the comparable sum in 1947.

Electric power production increased slightly in the week ended April 17. The output was 9.2 per cent above the corresponding amount in 1947, as compared with a similar advance of 8.9 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 785,668 cars, 14.9 per cent more than the figure for the week before but 9.3 per cent below the corresponding number recorded in 1947.

Crude oil production in the week ended April 17 averaged 5,390,650 bbl daily, or 13,250 bbl more than the preceding average and 478,550 bbl above the comparable output in 1947.

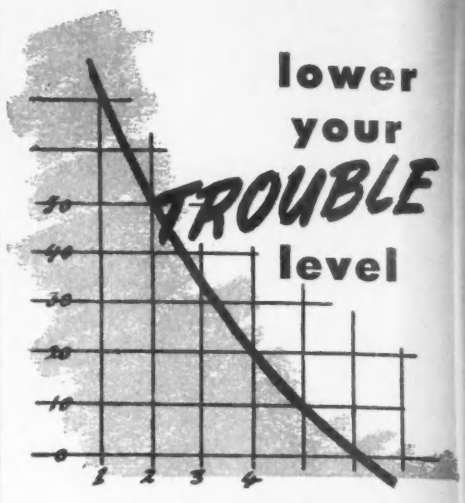
Production of bituminous coal and lignite during the week ended April 17 is estimated at 7,715,000 net tons, more than three times the output in the week before. The total production in 1948 so far reported is 19.8 per cent below the corresponding quantity in 1947.

Civil engineering construction volume reported for the week ended April 22, according to *Engineering News-Record*, is $136,743,000, or five per cent less than the preceding weekly figure but 55 per cent above the comparable sum in 1947. The total recorded for 17 weeks of this year is 23 per cent more than the corresponding amount in 1947. Private construction is three per cent below that a year ago, but public construction has increased by 64 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended April 17 is 162.9 per cent of the 1926 average, as compared with 160.6 for the preceding week and 147.2 a year ago.

Member bank reserve balances decreased $205 million during the week ended April 21. Underlying changes thus reflected include a decline of $164 million in Reserve bank credit and a rise of $106 million in Treasury deposits with Federal Reserve banks, accompanied by a decrease of $56 million in money in circulation.

Total loans and investments of reporting member banks declined $14 million during the week ended April 14. A reduction of $65 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, $14,333 million, shows a net increase of $2161 million in 12 months.



D. A. Stuart Oil Co. Can Do Jobs Like This for You

". . . Stuart's SOLVOL was put in on a trial basis for milling high carbon alloy steel. High-speed alloy cutters were used and it was found that SOLVOL increased the cutter life 3 to 4 times over what they had been getting."

". . . on switching to SUPERKOOL, operator reported less mist from the precision grinding machine . . . production increased to 200 pieces . . . finish improved 2 to 4 micro inches . . . foreman and lubrication engineer well pleased."

"Stuart's SOLVOL was put in on a trial basis for use in milling machines on high carbon alloy steel. High speed alloy cutters were used and it was found that SOLVOL increased the cutter life three to four times over what they had been getting. This customer is well pleased with SOLVOL and will continue to use it in the future on these machines."

The above case studies are typical of results being secured throughout industry with Stuart oils correctly applied to the job. D. A. Stuart Oil representatives are not miracle workers, but they have back of them a tremendous fund of experience and technical assistance. If you are having trouble due to cutting oils you can count on them to minimize the troubles. Write for D. A. Stuart booklet, "Cutting Fluids for Better Machining."

Stuart Oil Engineering Goes with Every Barrel

D. A. Stuart Oil Co.
EST. 1865 LIMITED

2733 SO. TROY STREET, CHICAGO 23, ILL.

PERFECT Oil Seals

Designed TO MEET YOUR NEEDS

The seal illustrated, Type "P", is generally adaptable to the majority of mechanical sealing requirements. However, it is but one of 14 available types of Perfect Oil Seals made in more than 1800 sizes. These carry time-tested sealing elements of either Sirvis Leather or Sirvene Synthetic Rubber.

Included also are seals of the end face or surface type employing the principle of the lapped joint and recommended for high speed or high pressure installations and those where end play and misalignment may be encountered.

5004

All these Perfect Oil Seal types are fully described in our new catalogue, No. 947. If you haven't received your copy, write for one today.

OTHER C/R PRODUCTS
sirvis MECHANICAL LEATHER
SIRVENE SYNTHETIC RUBBER

OUR 70TH YEAR
INDUSTRIAL SERVICE

CHICAGO RAWHIDE MANUFACTURING CO.
1310 ELSTON AVENUE • CHICAGO 22, ILLINOIS

NEW YORK • PHILADELPHIA • DETROIT • LOS ANGELES • CLEVELAND • BOSTON • PITTSBURGH
SAN FRANCISCO • MINNEAPOLIS • CINCINNATI • HOUSTON • DENVER • SYRACUSE • PEORIA

Manufactured and Distributed in Canada by SUPER OIL SEAL MANUFACTURING CO., Ltd. – Hamilton, Ontario

Personals

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Thier Suppliers.

Mack Trucks, Inc.—**C. F. Larsen,** manager of General Service. **Harry Bernard,** Chief Engineer succeeding **W. M. Walworth,** resigned. **C. F. Drumm, Sr.,** General Engineer, Engineering Department (Allentown).

Chrysler Corp., Dodge Div.—**Lloyd J. White,** appointed to direct the new continuous sales training program for passenger car and truck divisions.

Ford Motor Co.—**Graeme K. Howard** elected Vice-Pres. and Director of International Div. and **Thomas G. Eybye** has been made his Executive Assistant. **Roy L. Jacobus** has been named Director of Insurance.

Chrysler Corp.—**W. E. Atkinson** appointed Service Manager, Los Angeles plant.

Wilson Foundry and Machine Co., subsidiary of Willys-Overland Motors —**W. G. Hambley,** elected Vice-President and Foundry Manager; **F. C. Miles,** elected Treasurer; **A. H. Shepherd** appointed Plant Engineer.

Hudson Motor Car Co.—**Robert W. Straughn** appointed Merchandising Manager.

Nash Motors Div., Nash-Kelvinator Corp. —**L. H. Nagler** appointed Technical Advisor.

Twin Coach Co.—**Stuart N. Smith,** made General Supt. in charge of all Manufacturing operations, Buffalo Div.

Kaiser-Frazer Sales Corp.—**C. A. Silcott,** General Service Manager.

The Glenn L. Martin Co.—**Charles Hart Miller** elected Vice-President—Sales.

The Electric Auto-Lite Co. — Three new vice-presidents elected are **C. M. Adams, F. H. Drummond** and **Robert Twells.** All are production men.

Ingersoll Utility Unit Div., Borg-Warner Corp.—**Charles R. D'Olive** made Vice-President and General Manager.

Eaton Manufacturing Co. — **R. C. Ochs** appointed Sales Manager, Saginaw Dynamatic Devices Div.

Howell Electric Motors Co. — **Charles T. Button,** appointed Vice-President in charge of sales.

Cummins Engine Co., Inc.—Newly elected vice presidents are **L. W. Beck,** Vice-President, Sales; **D. J. Cummins,** Vice-President, Engineering and **W. M. Harrison,** Vice-President and Treasurer. **Carl R. Fox** is a newly elected Director. **W. J. Manning** was elected Asst. Secretary and Asst. Treasurer and Controller.

Dearborn Motors Corp.—**I. R. Kappler** promoted to Manager of the newly created Purchasing Div.

Aviation Maintenance Corp. — **Franklin C. Wolfe** elected Vice-President in charge of Research and Development. **Wm. Maxfield** has been placed in charge of production.

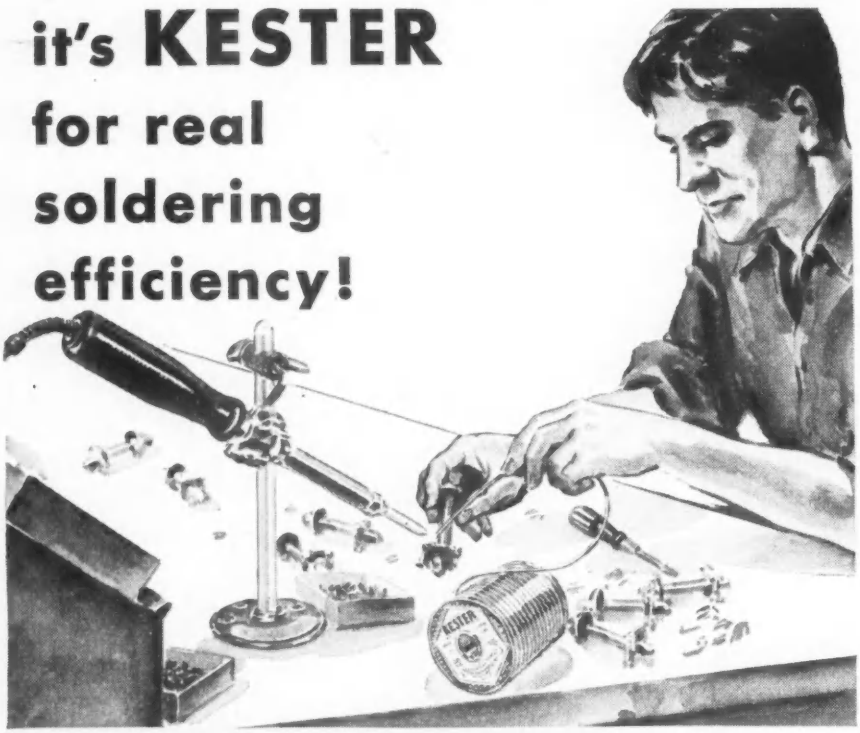
Young Radiator Co.—Two additions to the staff of the Mechanical Engineering Dept. are **Paul Mortenson** and **James A. McBride.**

Hanson-Van Winkle-Munning Co.— **Van Winkle Todd** appointed Chairman of the Board of Directors; **Guerin Todd,** appointed Vice-Chairman of the Board; **Louis M. Hague,** appointed President and **John A. Bauer,** appointed a Vice-President, assuming the former duties of Mr. Hague.

General Motors Institute—**Albert Sobey** named President and a Member of its board of regents.

The Reliance Electric & Engineering Co.—**W. R. Hough,** elected Engineering Vice-President.

it's KESTER for real soldering efficiency!

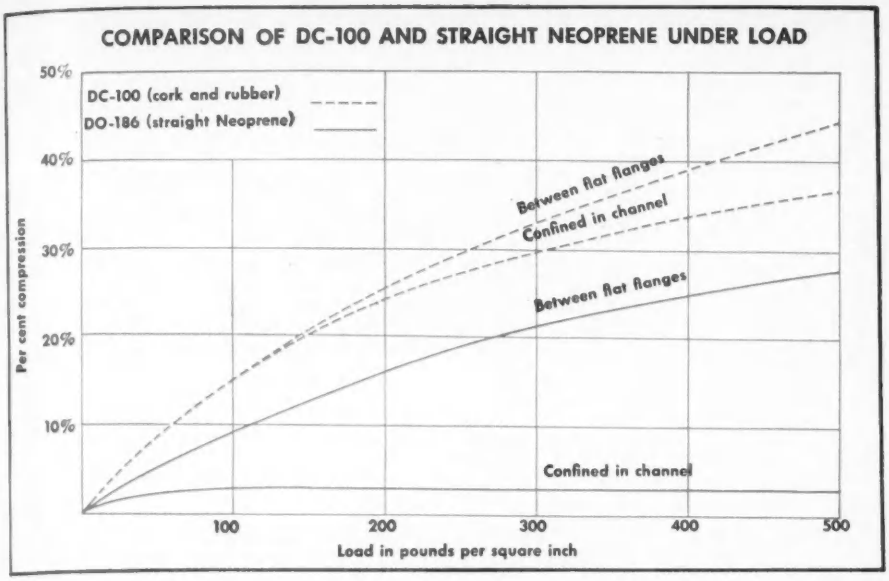


QUALITY — UNIFORMITY

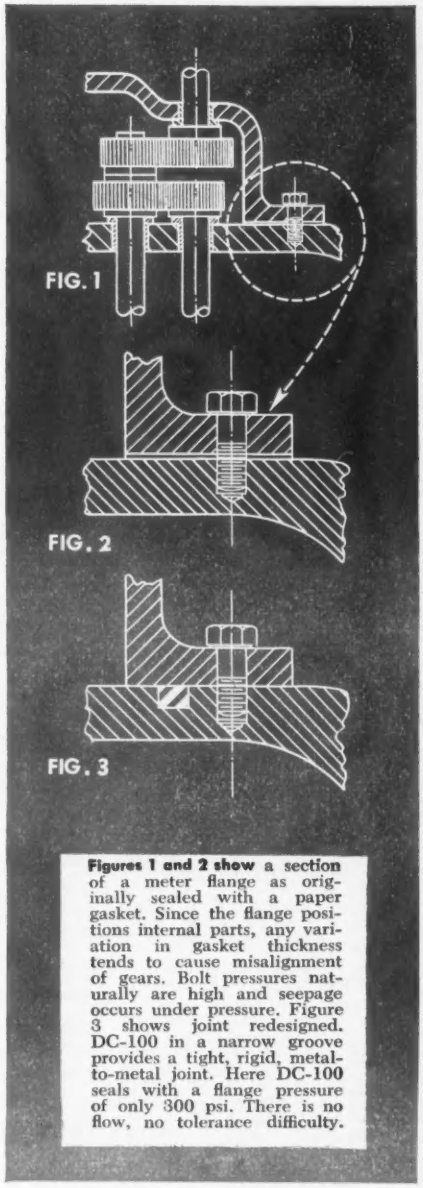
Improve performance and eliminate rejects by standardizing on Kester Cored Solders. When manufacturing costs and maintenance operations are high, it will pay dividends to use the best cored solder made.

There is a Kester Cored Solder that can be fitted to your needs. Troubled with a difficult soldering operation? Consult our engineers on any soldering problem. No obligation to you.

KESTER SOLDER COMPANY
4202 Wrightwood Ave., Chicago 39, Illinois
Factories also at—Newark, New Jersey, Brantford, Canada



DC-100



Figures 1 and 2 show a section of a meter flange as originally sealed with a paper gasket. Since the flange positions internal parts, any variation in gasket thickness tends to cause misalignment of gears. Bolt pressures naturally are high and seepage occurs under pressure. Figure 3 shows joint redesigned. DC-100 in a narrow groove provides a tight, rigid, metal-to-metal joint. Here DC-100 seals with a flange pressure of only 300 psi. There is no flow, no tolerance difficulty.

HOW TO USE ARMSTRONG'S DC-100

1. When confined on four sides or two

2. To reduce bolting pressure

3. To seal rough-machined parts

Armstrong's DC-100 is a medium density Neoprene-and-cork gasket material. Between flanges, it can be reduced in volume approximately 30% with virtually no side flow. Because this true compressibility frees the designer from certain restrictions inherent in non-compressible materials, DC-100 offers a varied range of uses.

1. DC-100 can be used either confined on four sides in a channel or held on two sides between flat flanges. Totally confined, it needs no allowance for flow since it compresses to permit positive flange location. Between flanges, it seals without objectionable extrusion. As shown in the chart given above, DC-100 under pressure reacts practically the same whether partially or wholly confined.

2. Because its cork content gives DC-100 high surface friction, gaskets of this material will not skid on smooth or greasy flanges. Consequently, DC-100 seals normal flange surfaces at bolt pressures lower than straight rubber compounds of the same durometer hardness. Thus DC-100 permits use of thinner flange sections. In existing joints, it can reduce strain on flanges or other parts.

3. Controlled compressibility enables DC-100 to accommodate wider manufacturing tolerances. Flange surfaces need not be highly finished because DC-100 fills in minor irregularities. Bolting pressures may vary within wide limits, and less care need be taken to keep flanges parallel.

DC-100 has good aging qualities. Used for any of the services mentioned above, it maintains good "kick-back" pressure. High surface friction insures good blowout resistance. It will seal after repeated making and breaking of a joint. Fluids resistance compares with that of straight Neoprene compounds.

While DC-100 will handle a wide range of sealing problems, it may not be the most suitable material for a given application. A whole range of Armstrong's cork-and-rubber compositions is made, each with the same basic characteristics but modified to meet the requirements of various types of applications. We recommend, therefore, that you discuss your needs with an Armstrong representative. He will suggest solutions to your particular problem and supply test samples of any of the Armstrong gasket and sealing materials listed below.

SEND FOR FREE BOOKLET.
Get new, 20-page "Armstrong's Gasket and Sealing Materials." It includes specification data on more than 40 of Armstrong's resilient sealing materials and also helpful hints on their proper application. Write to Armstrong Cork Co., Gaskets and Packings Department, 1505 Arch Street, Lancaster, Pennsylvania.

ARMSTRONG'S
GASKETS · SEALS · PACKINGS

Cork Compositions • Cork-and-Synthetic-Rubber Compositions
Synthetic Rubber Compounds • Cork-and-Rubber Compositions
Fiber Sheet Packings • Rag Felt Papers • Natural Cork

General News

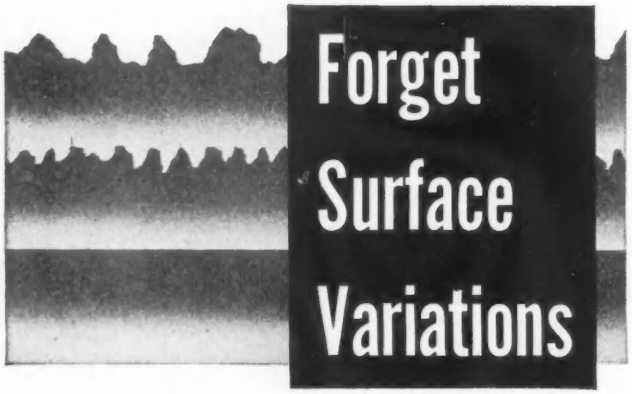
(*Continued from page* 23)

Nash Nets $4.8 Million In Quarter

The net profit of The Nash-Kelvinator Corp., after taxes, declined during the three months period ended March 31 to $4,751,848, compared with a net profit of slightly more than $5.6 million for the previous quarter. The earnings, however, were slightly above the same period of 1947. Shortages of steel and gas fuel limited production during the quarter, with plants down at times during January, February, and March.

RECENTLY CERTIFIED

Now being produced by the Stinson Div., Consolidated Vultee Aircraft Corp., Wayne, Mich. this float-equipped, multi-purpose, four - place 1948 Stinson Flying Station Wagon, together with the 1948 Stinson Voyager, has been certificated by the CAA for seaplane operation.



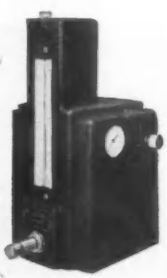
MERZ NEW-MATICS ACCURATELY MEASURE I.D. OR O.D. . . . REGARDLESS OF SURFACE CONDITIONS

● Only MERZ *New-Matic* Measuring Machines enable you to obtain identical I.D. or O.D. readings—*every time*—on parts of like diameter . . . *regardless of surface variations.* In MERZ *New-Matics*, a synthetic ruby button contacts only the highest surface points. Unlike conventional gages—where compressed air directly touches *all* surfaces, high and low alike—MERZ *New-Matics* are unaffected by any surface variations.

For the same reason, MERZ *New-Matics* are the only air-actuated units capable of accurately gaging parts in which perforations or keyways have been machined. MERZ *New-Matic* Measuring Machines also permit accurate gaging to the extreme edges.

For full details on these and many other advantages of MERZ inspection equipment, write for free 20-page book on the *New-Matic* principle of measuring and sorting.

MERZ ENGINEERING COMPANY • INDIANAPOLIS 7, IND.



MERZ "Master" New-Matic Measuring Machine. Other New-Matic models for every inspection purpose.

MERZ

Navy Dedicates Laboratory In Inyokern, Calif.

Costing over $6 million, the new Michelson Laboratory was dedicated May 8 by the U. S. Navy at the Naval Ordnance Test Station at Inyokern, Calif. The new structure covers more than seven acres, and is designed for many types of basic research and scientific study.

Rear Wheel Bearings

Among the new passenger cars that will use self-sealed rear wheel bearings are the Ford, Lincoln and Mercury. It is pointed out by New Departure, which claims credit for the origination of this type of bearing, that it now has a record of use ranging to 14 years in Oldsmobiles, Cadillacs and Pontiacs.

Hudson Has Close Shave Leads by a Whisker

What-will-they-think-of-next item: Hudson Motor Car Co. announces that it has made available as an accessory an electric razor which plugs into the cigar lighter socket of the car. It can also be used in the home by connecting it to a conventional socket. The razor is manufactured by Remington-Rand, Inc. and has five cutting blades.

Ferguson Places Order for Tractor Parts

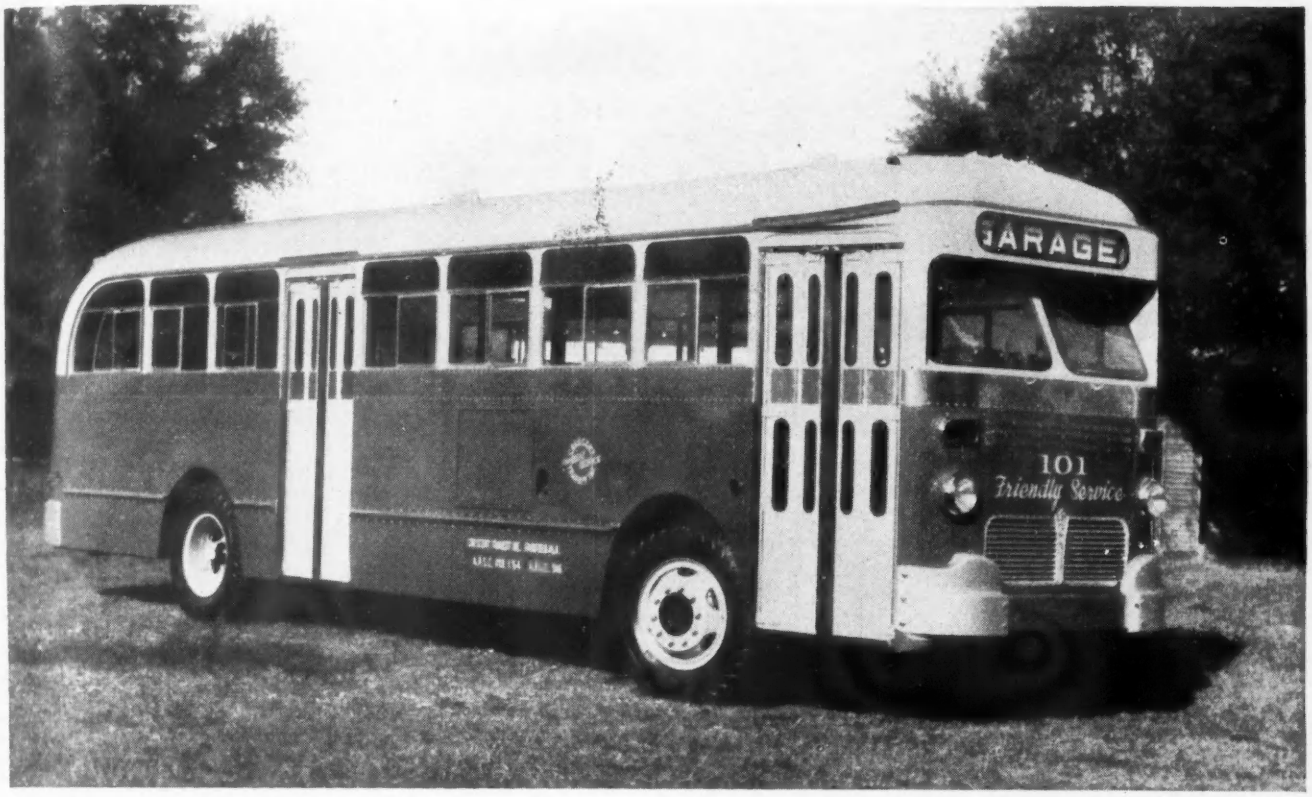
Harry Ferguson, Inc. has placed a $1.5 million order for precision parts and assemblies for Ferguson tractors and farm implements with Federal Industries, Inc. Shipment is scheduled to begin in August, with subsequent orders to be placed as production increases.

K-F Builds Extra Office Space

Kaiser-Frazer Corp. has begun a $350,000 third-story addition to the administration building at its Willow Run plant. Scheduled for completion in September, the new floor will provide an additional 12,000 sq ft of executive office space.

(*Turn to page* 102, *please*)

Steering AT ITS BEST



SOUTHERN'S 35-PASSENGER CITY BUS

ROSS BRINGS EASE . . . AND ECONOMY

THE Southern Coach Manufacturing Company, Inc., has good reason to be proud of these fine 1948 buses. Model F-35, illustrated above, is a 35-passenger city bus, distinguished in appearance and modern in every detail. Among the many outstanding features of the Southern buses is the good steering supplied by Ross.

Experience gained through the use of Ross steering gears on military vehicles during world war II has led to current improvements in Ross design, resulting in:

(1) ***Increased mechanical reduction*** . . . (2) ***More compactness of design*** . . . (3) ***Reduction in weight*** . . . (4) ***Greater arm angular-travel*** . . . (5) ***Improved metallurgy*** . . . (6) ***Increased efficiency.***

Throughout 41 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

Ross

Cam & Lever ***STEERING***

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA

WASHERS
STANDARD AND SPECIAL . . . . .
EVERY TYPE
EVERY MATERIAL
EVERY PURPOSE
EVERY FINISH

STAMPINGS
OF EVERY DESCRIPTION
- BLANKING
- DRAWING
- FORMING
- EXTRUDING

Let us quote on your requirements.
Over 22,000 Sets of Dies

WROUGHT WASHER MANUFACTURING CO.
The World's Largest Producer of Washers
2212 S. BAY ST., MILWAUKEE 7, WIS.

ACADIA *Synthetic* **PRODUCTS**
Synthetic rubber extrusions—molded shapes—sheets—cut parts produced to closest tolerances.
Write for information.
WESTERN FELT WORKS
4035-4117 Ogden Ave., Chicago 23, Ill. Offices in Principal Cities

Classified Advertisement

MOTOR COACH ASSEMBLY SUPERVISOR WANTED To supervise Chassis Assembly, Body in White Paneling, Paint, and Final Trim. Well established and progressive company in Middle West. Reply Box 54, Automotive Industries, Chestnut and 56th St., Philadelphia 39.

WANTED A well established Midwestern Corporation has an opening for an electrical engineer familiar with thermal type circuit breakers and related devices. The applicant must be capable of taking complete charge of a development program. Salary commensurate with ability and experience. Box 52, Automotive Industries, 5601 Chestnut St., Philadelphia 39, Pa.

Manufacturers representative covering Metropolitan New Jersey, desires nationally known line. Valuable contacts and satisfactory representation assured. Box 53, Automotive Industries, 5601 Chestnut Street, Philadelphia 39, Pa.

Unusual opportunity for aggressive salesmen. Quick selling specialty. Every service station and garage needs two or more. High commission. Side line permitted. Write Box 579 Realservice, 110 West 34th St., N. Y. 1, N. Y.

Wilhelm von Opel

Wilhelm von Opel, 76, German automobile manufacturer and former chairman of the board of the Opel Automobile Works which was later sold to GM, died on May 2 in Wiesbaden, Germany.

General News

(*Continued from page* 100)

To Produce Cortez in Longview, Tex.

The latest report on the new low priced automobile to be called the Cortez, to be built by North American Motors Corp., is that it will be produced at Longview, Tex. Capitalization of the company is reported to be entirely arranged for in the amount of $25 million.

Elect Garrett Director of U.S. Radiator

Paul Garrett, vice president in charge of public relations for GM, has been elected a director of U. S. Radiator Corp.

Brown Instrument Expansion To Cost $2.5 Million

Adding more than 60 per cent to present manufacturing space and proportionately increasing employment, a $2.5 million expansion program has been announced by the Brown Instrument Co., Philadelphia.

Name Sloan President of N.Y. Economic Club

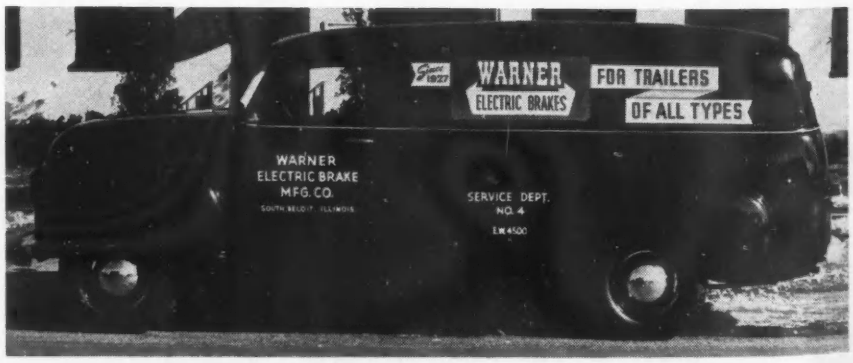
Mr. Alfred P. Sloan, Jr., chairman of General Motors Corp., was recently named president of the Economic Club of New York.

C. W. Avery Made Director of Bendix Aviation

Clarence W. Avery, board chairman of Murray Corp., and John M. Floyd, vice president and a director of A. O. Smith Corp., have been elected directors of Bendix Aviation.

David Pryce Davies

David Pryce Davies, 78, vice president and consulting engineer, J. I. Case Co., Racine, Wis., died on April 25, 1948.



TRAVELLING TRAINER

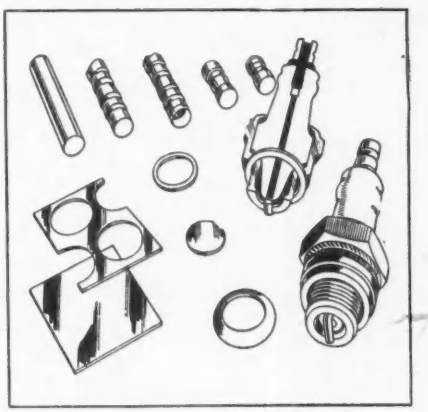
The Warner Electric Brake Mfg. Co., Beloit, Wis. is using this mobile travelling field service school to train servicemen who find it inconvenient to come to the factory. This special truck contains a tractor-trailer mock-up depicting the complete Warner braking system.

BUSINESS IN MOTION

To our Colleagues in American Business . . .

The automobile industry is regarded by suppliers as a highly desirable customer. Its orders are large, and strict insistence on quality standards keeps a company on its toes. The industry's demands for ever better materials, higher production, and lowest possible prices consistent with quality have been in part responsible for making the automobile business America's greatest, giving employment to one-seventh of our country's workers.

It sometimes surprises industrialists who do not have direct contact with this great industry when they learn how painstaking is the attention given the smallest item. Take parts for spark plugs, for example. Revere supplies free-cutting brass rod for the terminals. This metal makes swift manufacture by the millions possible in automatic machines. Free-cutting brass is selected from the many available types of brass, because it is best for this fabrication process.



A spark plug also has gaskets, three of them. The obvious material for a gasket that is subjected to heat is copper. But what copper? There are many coppers. Silver-bearing copper is chosen, because it resists annealing, or softening, at spark plug temperatures. This copper is not the cheapest, but the best for its job of maintaining the seal required to prevent blow-by and loss of power.

Take an automobile down, part by part, and you find from 37 to 73 pounds of copper and copper alloys, each type chosen with the greatest care, no matter how small the individual part. Just as nothing seems to be too big for the automobile industry to accomplish, so nothing is too small for it to study. To be a supplier to that industry is indeed both an honor and a responsibility.

It does not seem that the future will produce a rival for the automobile industry in size, but more and more industries are rivaling it in their meticulous search for ways to make better goods, faster, and at lower prices. In that endeavor Revere collaborates closely with many of its customers. Any other supplier who is asked, is only too glad to place his accumulated knowledge at the disposal of buyers.

No company can stand alone; it must obtain the cooperation of many others, and utilize available experience in such diverse fields as design, material selection, fabrication, public relations, merchandising and advertising.

In every industry there are capable sources of such help, and today more than ever it is essential to go to them.

We like to think that American industry is a collaborative as well as competitive whole, in which employers and employees, sellers and buyers work together, each factor contributing in its own way, and each profiting accordingly, as in the automobile industry.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

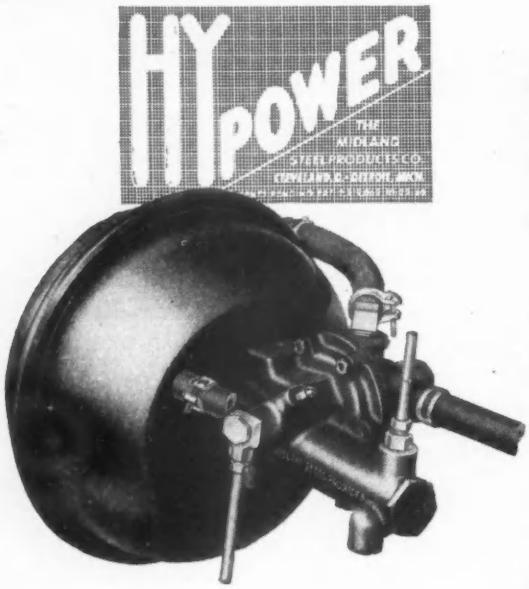
☆ ☆ ☆

Executive Offices:

230 Park Avenue, New York 17, N. Y.

See Midland

for the BEST BRAKES for YOUR JOB



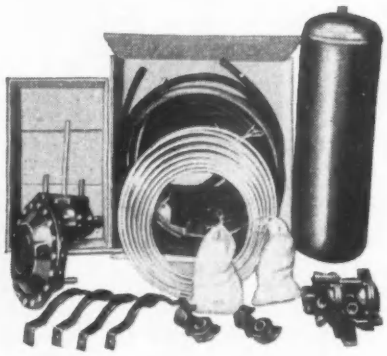
HY-POWER — Powerful, efficient, economical! . . . Self contained—sealed against all atmospheric conditions. . . . Never needs lubrication.

AIR BRAKE KITS — With the most efficient compressor. . . . Governor an integral part of compressor. . . . Tremendous reserve power.

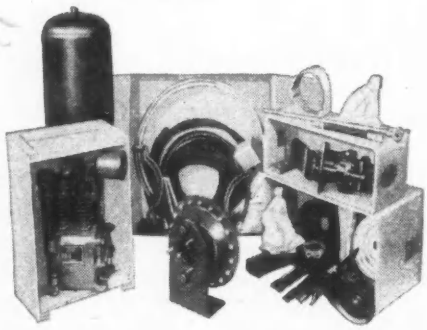
VACUUM BRAKE KITS — With exclusive compensating control valve—permitting any degree of brake application, with corresponding "brake feel." . . . Power to stop the heaviest loads easily and safely.

All Midland Power Brakes are backed by Midland's famous "Factory Rebuilt Exchange Plan."

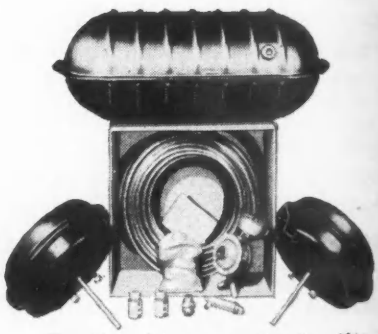
See your Midland distributor, or write to us for complete information.



Trailer Air Brake Kit



Complete Air Brake Kit—Truck or Tractor



Trailer Vacuum Brake Kit

THE MIDLAND STEEL PRODUCTS COMPANY
6660 MT. ELLIOTT AVENUE • DETROIT 11, MICH.
Export Department: 38 Pearl Street, New York, N. Y.

MIDLAND
POWER BRAKES